

KANSAS DROUGHT REPORT AND CLIMATE SUMMARY

Current Conditions, Drought Impacts and Outlook

May 2010

Cold start, warm finish to the month of May

It wasn't until the end of May that warmer temperatures prevailed. Freezing temperatures were seen in the Northwest and West Central National Weather Service climate divisions as late as the 13th of May. Only one record daily high was set, while 43 locations set record low daily highs. Diurnal variation was also low, as 44 locations set record warm low temperatures.

Statewide temperatures averaged 61.9° F or 1.7 degrees cooler than Normal. It ranks as the 34th coolest May from 1895 to present. Temperatures at or below freezing were seen in the western third of the state, as well as in the central climate division. Temperatures below freezing were seen as late as the May 13th, when Brewster recorded a 26° F low.

Preliminary statewide average precipitation was 4.06 inches, which was 102% of normal. Amounts varied from division to division, depending upon the track of the individual storms. The severe storm season continued to show strong activity. Preliminary reports show 44 tornadoes in Kansas during May. This was coupled with 178 reports of damaging hail and 94 reports of damaging wind. Preliminary data indicates the greatest monthly precipitation from a National Weather Service COOP site was 10.26 inches at Walnut 3S in Crawford County. The greatest monthly precipitation total from the CoCoRaHS network was also in Crawford County with 11.01 inches at Farlington 0.8 NNE.

With the near normal to above normal rains, conditions have improved so that the latest Drought Monitor has all of Kansas in near normal conditions. The latest Drought Outlook does not indicate expectation of developing drought conditions. The El Niño has faded, and La Niña conditions are expected to develop.

CURRENT COUNTY DECLARATIONS

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

Presidential major disaster declarations affecting Kansas:

Presidential Major Disaster Declarations in Kansas					
FEMA Disaster ID	Cause	Date	Kansas Centered	Adjoining State Centered (Kansas Counties)	Termination Date
M1902	SS, IJ, F	3/06/10-4/03/10	No	Nebraska: AT, BR, DP, JW, MS, NM, RP, WS	12/21/10
M1885	SWS, S	12/22/09 – 1/08/10	Yes		11/09/10
M1883	SWS	1/28/-1/30/10	No	Oklahoma: BA, HP	11/05/10
M1876	SWS	12/24-12/25/09	No	Oklahoma: CK, CL, LB, MG, SU	10/25/10
M1868	SWS	11/14-11/16/09	Yes		8/23/10
M1864	SWS	11/16-11/17/09	No	Nebraska: BR, DP, MS, NM, RP, WS	8/16/10

SWS: severe winter storm; SS: severe storm; T: tornado; F: flood; S: snowstorm; IJ: ice jams

Up-to-date information regarding designated counties and assistance available due to these declarations is available through the Federal Emergency Management Agency (FEMA) <http://www.fema.gov/dhsusda/index.jsp>. Assistance is available for varying periods of time after the disaster designation is affirmed. Disaster designations will be dropped from this list as the relief period ends.

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

- April 11, 2010 (10 counties) for losses to excessive rain from September 1 through Dec. 31, 2009
- March 18, 2010 (8 counties) for losses to frost, excessive rain, flash flooding, and flooding Sept. 1, 2009-Jan. 6, 2010.
- November 6, 2009 (3 counties) for losses caused by high winds and hail from July 17-September 3, 2009

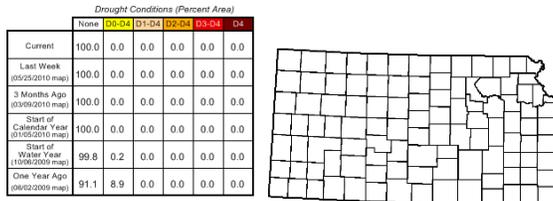
A state receives primary disaster declaration when the principal disaster occurs within the state. Counties within Kansas and counties in bordering states that are adjacent to them are identified as "contiguous." They also are eligible for disaster relief. For additional information regarding these USDA 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.

U.S. Drought Monitor Kansas

June 1, 2010
Valid 7 a.m. EST



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

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

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

USDA National Drought Mitigation Center
 Released Thursday, June 3, 2010
 Author: Brian Fuchs, National Drought Mitigation Center

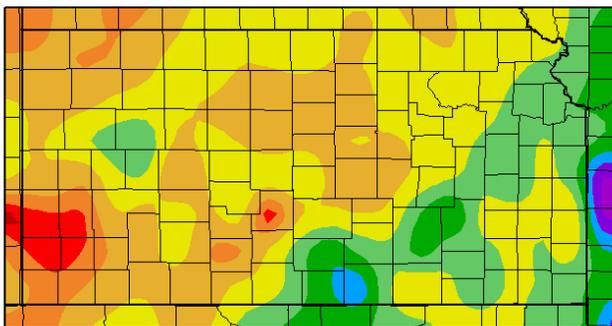
In the Kansas county drought stage scheme, a Drought Watch equates roughly to moderate drought in the U.S. Drought Monitor, while a Drought Warning is the equivalent of severe drought. A Drought Emergency is reserved for extreme or exceptional drought.

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 June 5th was 0.82 (near normal). Divisional PDSI values ranged from -0.12 (near normal) in the Central division to unusually moist value of 2.51 in the West Central division. The Palmer Drought Index is slower than the Drought Monitor to reflect condition changes from wet to dry and dry to wet.

May Conditions May ranks as the 74th wettest May on record (1895-2009) in Kansas with a statewide average total precipitation of 4.10 inches. This is 98 percent of normal. Based on preliminary reports, the greatest total precipitation received in May at [National Weather Service Cooperative Observers Climatological Network](#) stations, was 10.26 inches at Walnut 3S (Crawford County). Greatest for the Kansas [Community Collaborative Rain, Hail and Snow Network \(CoCoRaHS\)](#) for May 11.01 inches at Farlington 0.8 NNE (Crawford County). On the low end, Lakin recorded the least moisture at 0.76 inches according to the state’s NWS COOP observers. The least amount of moisture reported by CoCoRaHS observers was 0.70 inches at Syracuse.

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

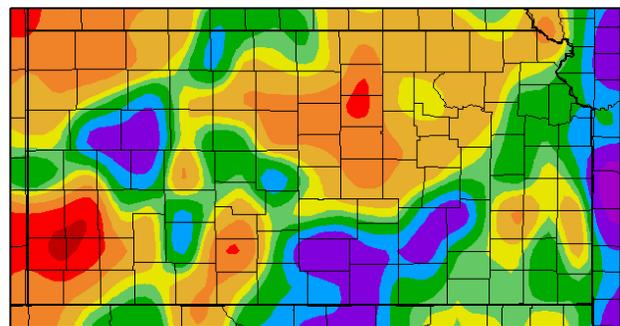
Precipitation (in)
5/1/2010 – 5/31/2010



Generated 6/2/2010 at HPRDC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
5/1/2010 – 5/31/2010



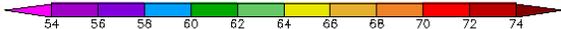
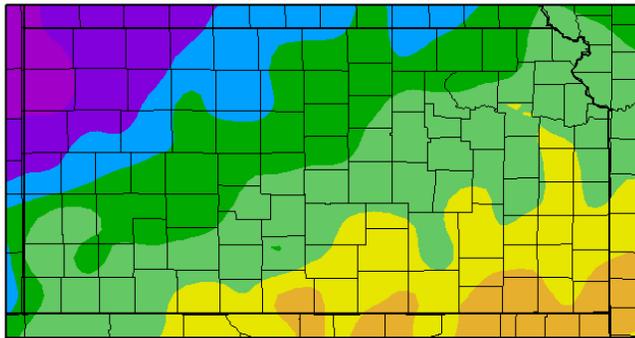
Generated 6/2/2010 at HPRDC using provisional data.

NOAA Regional Climate Centers

The statewide average temperature in May of 61.9° F was 1.7 degrees below normal. This was the 34th coolest May of record (1895-2009) for Kansas. May 1917 was the coldest with a statewide average temperature of 56.7 °F. Average monthly temperatures at individual reporting locations ranged from 54.3° F at Goodland 19SW (Sherman) to 66.7° F at Pittsburg (Crawford County). The highest temperature recorded in Kansas during May was 98° F at Syracuse (Hamilton County) on the 30th. The coolest reading observed in the state during May was 26° F at Goodland 19SW (Sherman County) on the 1st and at Brewster 4W on the 13th.

The following maps show average monthly temperature and the departure from normal across Kansas during April.

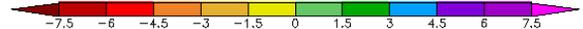
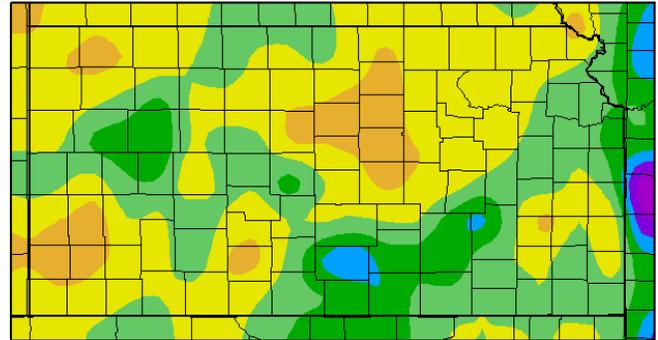
Temperature (F)
5/1/2010 - 5/31/2010



Generated 6/2/2010 at HPRCC using provisional data.

NOAA Regional Climate Centers

Departure from Normal Precipitation (in)
5/1/2010 - 5/31/2010



Generated 6/2/2010 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 April 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
May 2010
Kansas Climate Division Summary

Division	Precipitation (inches)						Temperature (°F)			
	April 2010			2010 through April 31			Average	Dep. ¹	Monthly Extremes	
	Total	Dep. ¹	% Norm	Total	Dep. ¹	% Norm			Highest	Lowest
Northwest	2.74	-0.77	78	8.52	1.04	114	56.6	-3.6	94	26
West Central	3.64	0.49	115	9.05	2.06	129	58.4	-2.7	93	29
Southwest	2.62	-0.38	85	6.86	0.11	100	62.0	-1.1	98	30
North Central	3.63	-0.32	92	10.84	1.34	114	60.6	-2.3	91	34
Central	3.69	-0.13	98	9.24	-0.71	93	62.2	-1.8	91	32
South Central	5.62	1.85	148	10.32	0.39	103	63.7	-1.2	92	33
Northeast	4.85	0.23	104	12.75	1.09	109	62.3	-1.6	90	37
East Central	4.36	-0.31	93	11.20	-1.37	90	63.3	-1.1	89	38
Southeast	5.29	0.26	106	12.30	-1.48	90	65.2	-0.3	90	35
STATE	4.06	0.14	102	9.99	0.18	103	61.6	-1.7	98	26

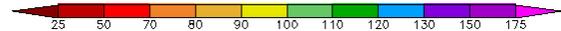
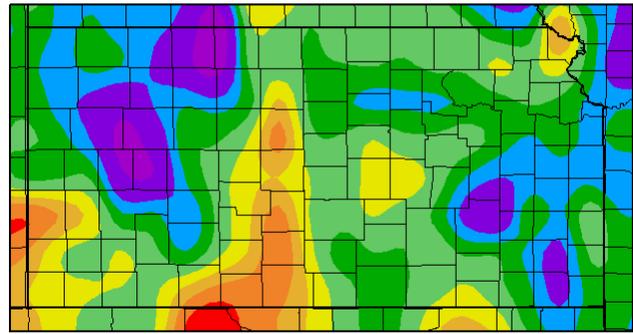
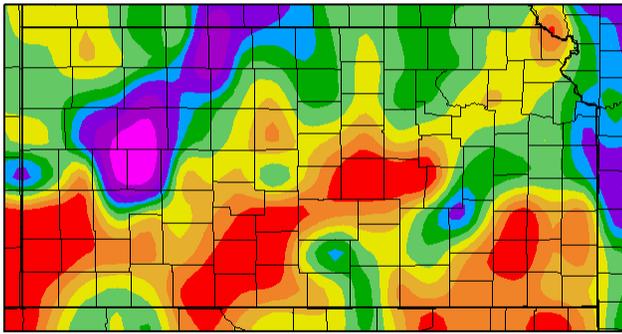
1. Departure from 1971-2000 normal value
2. State Highest temperature of 94 °F at Wilmore 16SE on the 1st.
3. State Lowest temperature of 19 °F at Goodland 19SW on the 3rd
4. Greatest rainfall reported was 10.26 inches at Walnut 35 (Crawford County)

Source: KSU Weather Data Library <http://www.ksre.k-state.edu/wdl/>

Longer-Term Precipitation Trends - The following two maps show the percentage of normal precipitation received across Kansas during the past three months (March 2010–May 2010) and during the past 12 months (June 2009–May 2010).

Percent of Normal Precipitation (%)
3/1/2010 – 5/31/2010

Percent of Normal Precipitation (%)
6/1/2009 – 5/31/2010



Generated 6/2/2010 at HPRDC using provisional data.

NOAA Regional Climate Centers

Generated 6/2/2010 at HPRDC using provisional data.

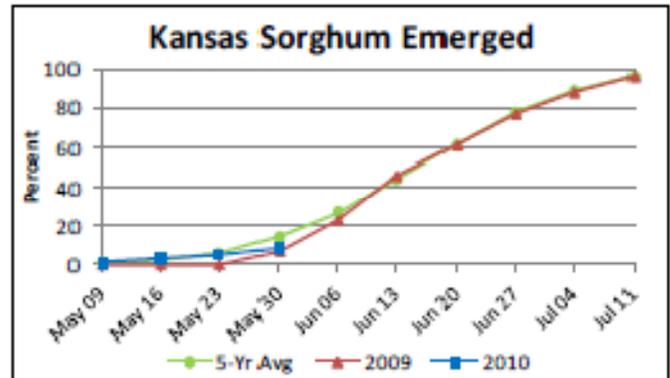
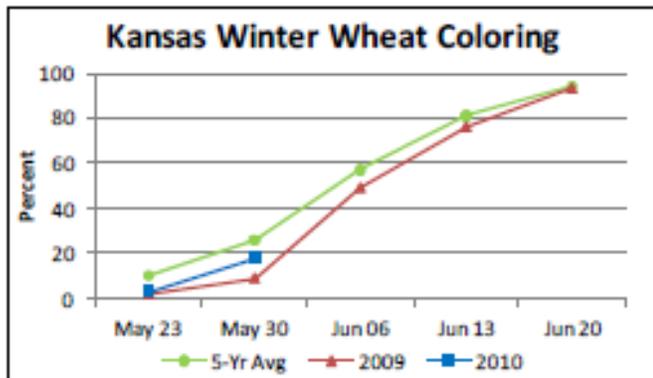
NOAA Regional Climate Centers

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 county [precipitation data](#) is available from the Weather Data Library at Kansas State University.

DROUGHT IMPACTS AND RESPONSE

Agriculture

The [Kansas Crop Progress and Condition Report](#) is updated weekly during the growing season and monthly during the winter. Depending on the time of the year, information includes crop conditions and progress, soil moisture conditions, range and pasture conditions, hay and pasture supplies and stock water supplies.



Wet weather pushed planting periods past average dates. Conditions, however, for row crop growth are favorable. The wet weather that delayed planting also put disease pressure on the wheat crop. Powdery mildew, leaf and stripe rust, and barley yellow dwarf were reported.

Ninety-six percent of the corn crop was planted, the same as last year, but behind the five-year average of 98 percent. Twenty-three percent of the sorghum had been planted, behind the 30 percent of last year and 34 percent for the five-year average. Fifty-three percent of the soybeans were planted, behind 59 percent in 2009 and 60 percent for the five-year average. Twenty-nine percent of the cotton has been planted compared to 57 percent last year and 44 percent average over five years. Seven percent of the sunflowers had been planted, behind 23 percent for both last year and the five-year average.

Alfalfa also is behind. Sixty-one percent has been cut compared to 71 percent in 2009 and 69 percent for the five-year average. Pastures are in good condition. Farmers were working between rain events to put up their hay.

Streamflow and Reservoir Levels

The U.S. Geological Survey [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 identifies locations experiencing below normal flows and hydrologic drought.

No streams are currently under Minimum Desirable Streamflow administration. Flows of the Republican River at Concordia and Clay Center and the Smoky Hill River at Ellsworth have been fluctuating. The flow at all three gages were lower at the end of May. They all, however, were well within the MDS levels. At Concordia, the Republican River flow as of June 2, 2010 was 1,080 cubic feet per second (cfs) compared to the June MDS of 150 cfs. At Clay Center, the Republican River current flow was 1,360 cfs compared to the June MDS level of 250 cfs. The flow of the Smoky Hill River at Ellsworth was 222 cfs compared to the June MDS of 45 cfs.

Table 2 summarizes federal reservoir pool elevations at the end of May 2010 in terms of departure from the top of the conservation/multipurpose pool and pool elevation changes since the end of April 2010.

Table 2 Kansas Federal Reservoirs End-of-Month Pool Elevation Summary					
Reservoir	Top MP/C Pool ¹	Pool Elevation (Feet MSL)		End of Period	
		4/30/2010	5/28/2010	Departure from Top ²	Change from End of April
Kansas River Basin					
Norton ³	2304.3	2296.2	2296.4	-7.9	0.2
Harlan County, NE	1946.0	1947.5	1947.5	1.5	0.0
Lovewell ³	1582.6	1582.4	1583.3	0.7	0.9
Milford ³	1144.4	1145.5	1145.8	1.4	0.3
Cedar Bluff	2144.0	2129.6	2131.3	-12.7	1.7
Kanopolis ³	1463.0	1464.5	1467.7	4.7	3.2
Wilson ³	1516.0	1516.6	1516.5	0.5	-0.1
Kirwin ³	1729.3	1730.9	1730.7	1.4	-0.2
Webster ³	1892.5	1894.5	1893.4	0.9	-1.1
Waconda ³	1455.6	1454.4	1454.0	-1.6	-0.4
Tuttle Creek ³	1075.0	1078.8	1077.2	2.2	-1.6
Perry ³	891.5	892.3	896.8	5.3	4.5
Clinton ³	875.5	877.9	880.0	4.5	2.1
Pomona ³	974.0	980.2	982.2	8.2	2.0
Melvern ³	1036.0	1040.4	1040.9	4.9	0.5
Hillsdale ³	917.0	919.0	920.4	3.4	1.4
		Ark River Basin 3/31/2010	Ark River Basin 6/2/2010		
Cheney	1421.6	1421.8	1422.2	0.6	0.4
El Dorado	1339.0	1339.1	1339.6	0.6	0.5
Toronto ³	901.5	901.3	902.0	0.5	0.7
Fall River ³	948.5	949.5	949.6	1.1	0.1
Elk City ³	796.0	795.6	796.2	0.2	0.6
Big Hill	858.0	858.4	858.1	0.1	-0.3
Council Grove ³	1274.0	1272.6	1274.1	0.1	1.5
Marion ³	1350.5	1350.4	1350.4	-0.1	0.0
John Redmond ³	1039.0	1037.6	1041.7	2.7	4.1
1. Elevations listed are the multi-purpose/conservation pool level. All figures are in comparison to this level, not the seasonal pool operation levels that are in effect at numerous reservoirs. El Dorado has a seasonal pool level. 2. All values are in feet. Negative departures or changes are shown in red. Source: U.S. Army Corps of Engineers 3. Lake level management plan in place					

To better manage a reservoir for multiple purposes, lake level management plans have been developed. The water levels of these lakes fluctuate during a year according to the management plan. [Lake level management plans](#) are posted on the Kansas Water Office web site www.kwo.org Maintenance operations require drawing the lake level below elevations listed in a reservoir's Lake Level Management Plan. Maintenance is planned for John Redmond.

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.

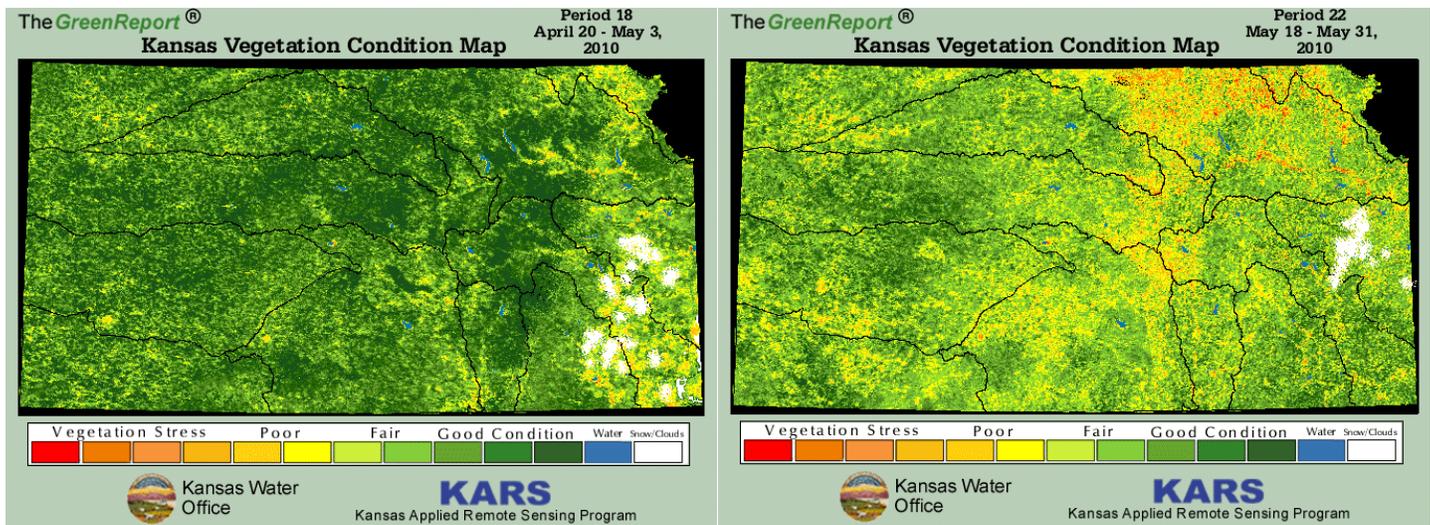
[Responding to Drought: A Guide for City, County and Water System Officials](#) provides an overview of Kansas county drought stage declarations, local planning and coordination, disaster declarations, and available state and federal assistance.

Vegetation Conditions (Early vs. late April)

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.

For a full set of national and regional **GreenReport®** maps, go to: <http://www.kars.ku.edu/products/greenreport/greenreport.shtml>

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.



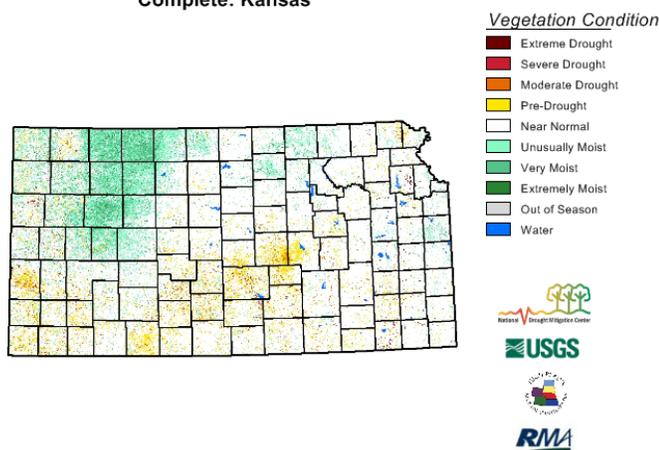
The month of May started out with cool temperatures and abundant moisture, making excellent vegetative conditions across Kansas. As temperatures increased and rainfall declined, conditions changed slightly in several parts of the state. The late May map indicates some poor conditions in the northeastern part of the state. This may be due to delayed growth of corn and soy (where normally it would be greener at this time), and a dry week with higher temperatures.

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.

Vegetation Drought Response Index Complete: Kansas

May 31, 2010



Wildfire

No large wildfires were reported to the Kansas Forest Service in May.

The [Wildland Fire Outlook](#) issued by the National Interagency Fire Center on June 1 foresees normal to below normal significant wildfire potential across Kansas during the July-September 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.

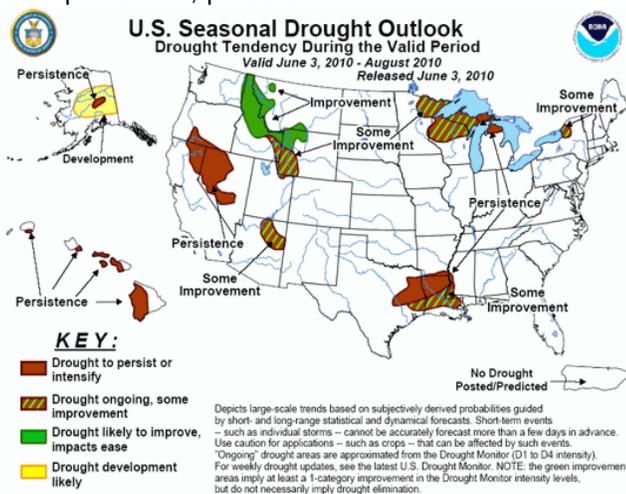
The National Weather Service provides a full range of fire weather products and services for Kansas. Included are the Rangeland Fire Danger Index, Fire Weather Forecasts, Red Flag Watches/Warnings, and Spot Forecasts. Each NWS

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 also are 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 May 6, 2010 for the period through July 2010 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 Hank Ernst at the Kansas Water Office (785) 296-3185) or hank.ernst@kwo.ks.gov should you have any questions or suggestions.

**Appendix A
May 2010
Kansas Regional Climate Summary**

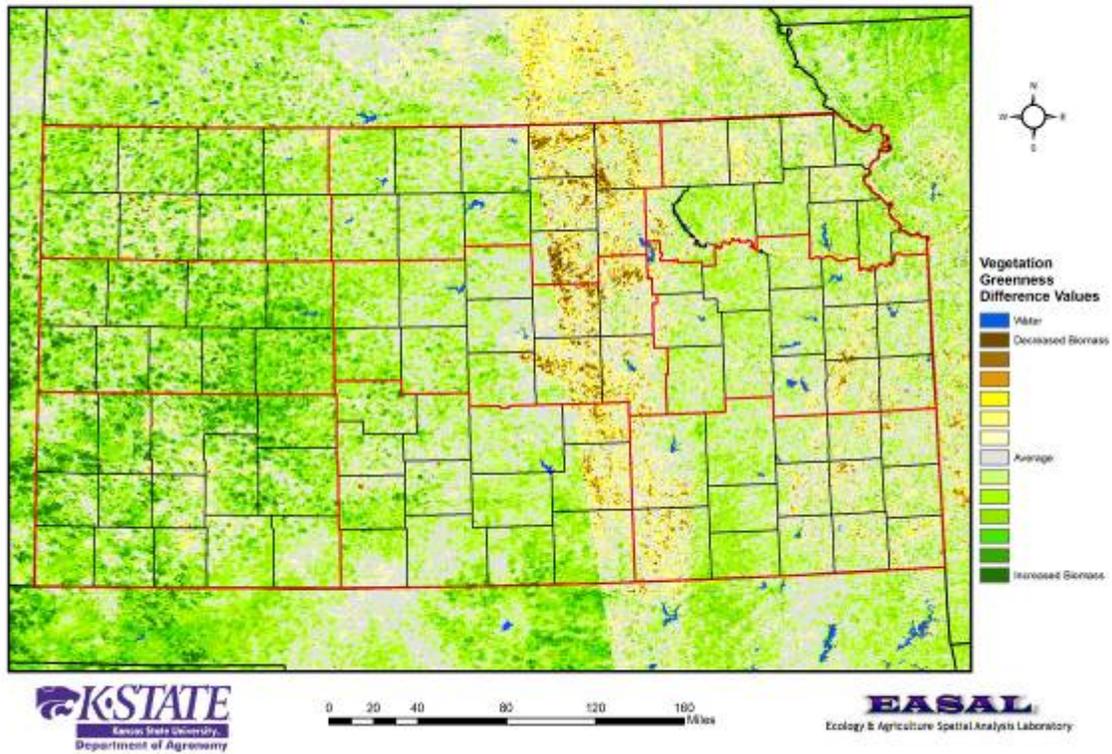
Station1	Precipitation (inches)			Temperature (Degrees Fahrenheit)			
	Total	Departure	Percent Normal	Mean	Departure	Extreme (Date)	
						Highest	Lowest
West							
Burlington, CO	2.30	-0.58	80%	56.4	-1.2	92 (29)	27 (1)
Dodge City	4.04	1.04	135%	62.1	-1.7	90 (29)	32 (8)
Garden City	2.26	-0.83	73%	61.6	-1.4	93 (29)	32 (13)
Goodland	2.83	-0.63	82%	55.8	-2.9	91 (22)	29 (5)
Guymon, OK	2.63	-0.51	84%	63.7	-0.5	94 (22)	31 (2)
Hill City	4.11	0.48	113%	60.8	-0.1	94 (29)	35 (7,1)
Lamar, CO	1.17			60.8		97 (29)	28 (2,1)
McCook, NE	2.27	-0.99	70%	57.7	-2.8	90 (29)	31 (8)
Springfield, CO	1.08			59.4		92 (29)	29 (13,1)
Central							
Concordia	3.54	0.66	123%	60.4	-2.6	85 (29)	34 (8)
Hebron, NE	2.99	-1.47	67%	61.0	0.3	89 (29,23)	36 (8)
Medicine Lodge	4.76	0.83	121%	66.2	0.4	91 (29)	35 (8)
Ponca City, OK	4.90			67.0	-1.2	91 (30)	35 (8)
Salina	4.16	-0.95	81%	63.5	-1.4	89 (29)	35 (8)
Wichita (ICT)	6.47	2.31	156%	65.7	0.7	88 (30,29)	39 (8)
East							
Bartlesville, OK	4.66	-0.10	98%	67.1	-1.6	90 (30,29)	36 (8)
Chanute	3.52	-1.77	67%	65.9	0.6	88 (30,28)	39 (8)
Fall City, NE	4.17	-0.16	96%	62.3	-1.7	88 (24)	39 (8)
Johnson Co. Exec. Apt	5.73	0.32	106%	63.7	-1.6	87 (28)	41 (8)
Joplin, MO	7.55	2.48	149%	66.8	0.7	88 (30,25)	40 (8)
Kansas City (MCI), MO	6.20	0.81	115%	64.0	-0.3	88 (30,24)	42 (8)
St. Joseph, MO	5.43	0.48	110%	63.1	-1.7	89 (24)	41 (8)
Topeka (TOP)	6.58	1.72	135%	64.7	0.3	89 (30)	38 (8)

1. Airport Automated Observation Stations (NWS/FAA)
2. Departure from 1971-2000 normal value
T - Trace; M - Missing; --- no normal value from which to calculate departure or percent of normal
Source: National Weather Service F-6 Climate Summaries

Appendix B

Kansas Vegetation Condition Comparison

Late-May 2010 compared to the 21-Year Average for Late-May



The Vegetation Condition Report for May 17 – June 1, from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that there was significant cloud cover over central Kansas during the last two weeks of May. This can be seen by the apparent decrease in vegetation from Republic and Washington counties down to Cowley and Sumner counties on the Oklahoma border. This cloud cover masks the reflectivity from the vegetation, giving the appearance of poor condition.