KANSAS CLIMATE and DROUGHT UPDATE
November 2018 Summary

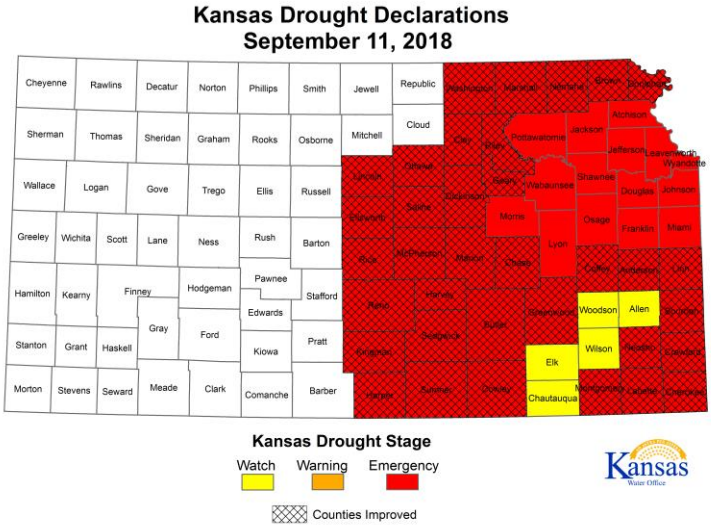
Highlights

- Executive Orders 18-18 remains in effect for 50 counties in emergency status, and 5 in watch, primarily to allow continued assistance to mitigate drought impacts on livestock from the summer.

- U.S. Drought Monitor drought designations were removed for all but under one percent of Kansas (About 6% of the state remained abnormally dry through November 20.

- Kansas Department of Health and Environment closed the season for Harmful Algal Bloom (HAB) monitoring October 31. At that time two water bodies remained in active bloom: Frazier Lake, in Grant County was at a Warning status; and South Lake, in Johnson County was at a Watch status. The next harmful algal bloom season will begin again on April 1st 2019.

Governor Jeff Colyer, MD issued Drought Declarations for Kansas counties with Executive Order (EO) 18-17 on September 11, 2018 placing 50 counties in emergency status and 5 into a watch status. A total of 55 counties were downgraded, 50 of these having drought declarations removed. EO 18-18 corrected the listing of counties. The September 11 map shows these counties. These Drought Declarations remain in place until revised or rescinded by a subsequent EO.



Drought Watch counties: Allen, Chautauqua, Elk, Wilson, Woodson

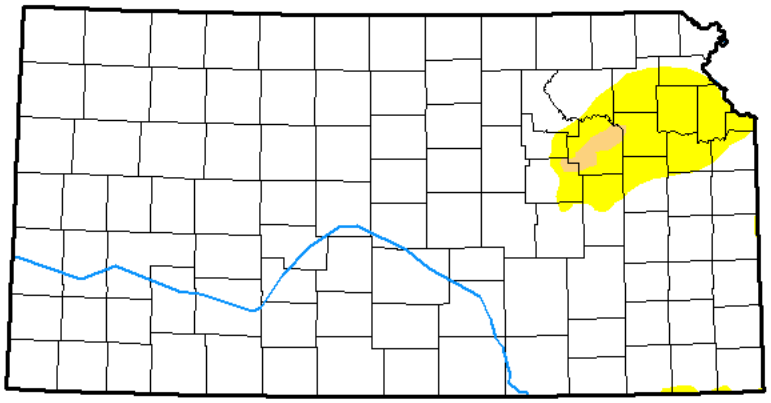
Drought Emergency counties: Anderson, Atchison, Bourbon, Brown, Butler, Chase, Cherokee, Clay, Coffey, Cowley, Crawford, Dickinson, Doniphan, Douglas, Ellsworth, Franklin, Geary, Greenwood, Harper, Harvey, Jackson, Jefferson, Johnson, Kingman, Labette, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Miami, Montgomery, Morris, Nemaha, Neosho, Osage, Ottawa, Pottawatomie, Reno, Rice, Riley, Saline, Sedgwick, Shawnee, Sumner, Wabaunsee, Washington, Wyandotte

In counties under Emergency Drought Declaration, livestock water may be available from some state fishing lakes and federal reservoirs when properly permitted. To initiate the process, please contact the Kansas Water Office at 785-296-3185.

General Conditions

Despite the lower than normal precipitation, cooler than normal temperatures resulted in little change to the drought conditions. The area of the state that was drought free moved to 93 percent at the end of the month. Moderate drought and abnormally dry conditions linger in the eastern parts of the state.

U.S. Drought Monitor
Kansas



November 27, 2018
(Released Thursday, Nov. 29, 2018)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	93.34	6.66	0.46	0.00	0.00	0.00
Last Week 11-20-2018	93.48	6.52	0.46	0.00	0.00	0.00
3 Months Ago 08-28-2018	45.57	54.43	25.60	14.79	6.25	0.75
Start of Calendar Year 01-02-2018	0.00	100.00	32.70	8.75	0.00	0.00
Start of Water Year 09-25-2018	78.54	21.46	14.80	9.73	5.67	0.38
One Year Ago 11-28-2017	52.88	47.12	15.33	0.00	0.00	0.00

Intensity:

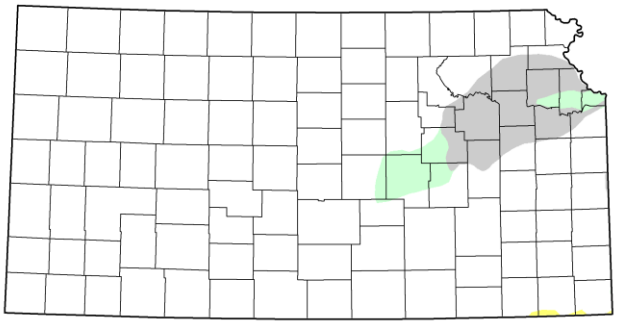
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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

Author:
Richard Heim
NCEI/NOAA

http://droughtmonitor.unl.edu/

U.S. Drought Monitor Class Change - Kansas
1 Month



5 Class Degradation
4 Class Degradation
3 Class Degradation
2 Class Degradation
1 Class Degradation
No Change
1 Class Improvement
2 Class Improvement
3 Class Improvement
4 Class Improvement
5 Class Improvement

November 27, 2018
compared to
October 30, 2018

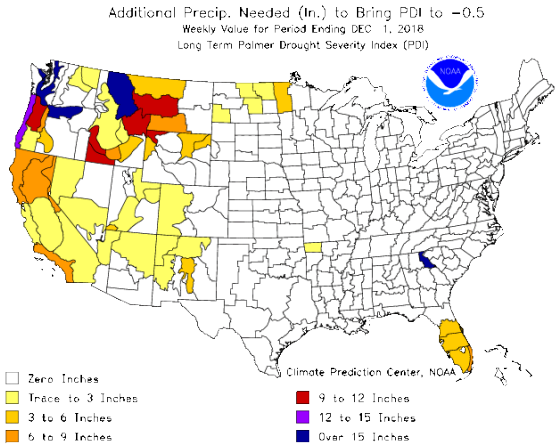
http://droughtmonitor.unl.edu

Changes in drought classification during the month are shown on the left.

More information can be found on the U.S. Drought Monitor web site https://droughtmonitor.unl.edu/ .

Palmer Drought Severity Index (PDSI) - The Palmer Drought Severity Index is an indicator of relative dryness or wetness and is one factor used the U.S. Drought Monitor. The additional precipitation map indicates the inches of precipitation needed to be out of drought for the climate division.

More information on the PDSI can be found at http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml



State Drought Mitigation

Livestock Water

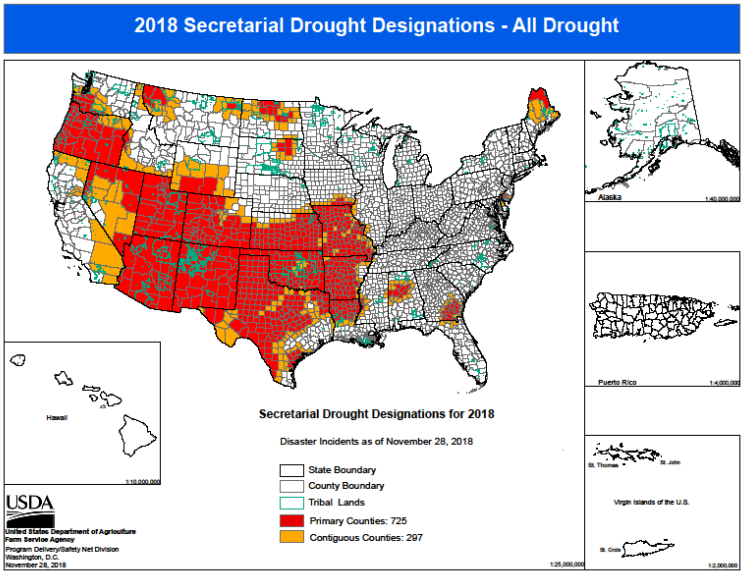
Emergency livestock water is available to producers in counties under Kansas Drought Emergency Declarations. The Kansas Water Office will verify eligibility for arrange for withdrawal permit processing. The producer must pump and haul water to livestock tanks and follow procedures to ensure aquatic nuisance species are not introduced to water bodies. If harmful algal blooms advisories are issued for a lake, withdrawals are not allowed.

Financial assistance for livestock water supply wells, pipeline and tanks may also be available through Environmental Quality Incentives Program (EQIP) Drought Initiative by NRCS or Kansas Department of Agriculture-Division of Conservation through the Livestock Water Supply Financial Assistance Initiative in Emergency counties. Applications can be made through local conservation districts.

Federal Disaster Drought Declarations 2018

U. S. Department of Agriculture Drought Disaster

USDA Secretary makes agricultural disaster designations based on crop losses in a designated county. Disaster designations make emergency (EM) loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. In addition to EM loan eligibility, other emergency assistance programs, such as Farm Service Agency (FSA) disaster assistance programs, have historically used disaster designations as an eligibility trigger.



USDA drought disasters have been declared in 2018 for Kansas. Designations are for 85 primary counties and 11 contiguous counties. Primary counties include Allen, Anderson, Atchison, Barber, Barton, Brown, Butler, Chase, Chautauqua, Cherokee, Clark, Clay, Coffey, Comanche, Cowley, Dickinson, Doniphan, Douglas, Edwards, Elk, Ellis, Ellsworth, Finney, Ford, Franklin, Geary, Grant, Gray, Greeley, Greenwood, Hamilton, Harper, Harvey, Haskell, Hodgeman, Jackson, Jefferson, Johnson, Kearny, Kingman, Kiowa, Labette, Lane, Leavenworth, Lincoln, Linn, Lyon, Marion, Marshall, McPherson, Meade, Miami, Montgomery, Morris, Morton, Nemaha, Neosho, Ness, Osage, Ottawa, Pawnee, Pottawatomie, Pratt, Reno, Rice, Riley, Rush, Russell, Saline, Scott, Sedgewick, Seward, Shawnee, Stafford, Stanton, Stevens, Sumner, Trego, Wabaunsee, Wallace, Washington, Wichita, Wilson, Woodson and Wyandotte. Contiguous counties are Bourbon, Cloud, Crawford, Gove, Graham, Logan, Mitchell, Osborne, Republic, Rooks, and Sherman.

Climate Summary - Precipitation

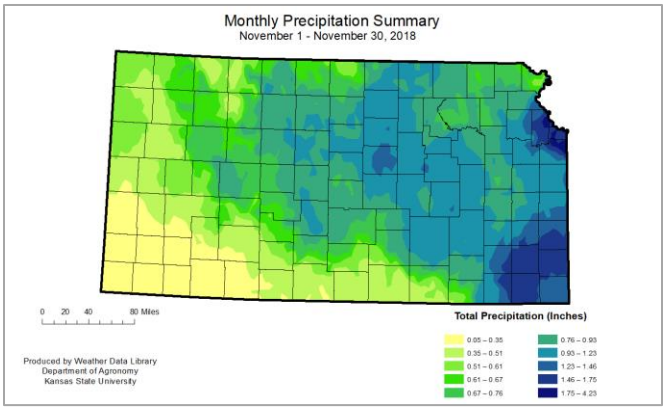
November was drier than normal across most of the state, providing a welcome relief to the very wet conditions in October. State-wide average precipitation was 1.26 inches, 89 percent of normal. The Southwest Climate Division was the driest with an average of 0.35 inches. That is a deficit of 0.31 inches, 53 percent of normal. The North Central Division was the wettest with an average of 1.99 inches, 180 percent of normal. There were 8 new daily record rainfall totals, none of which set new records for any day in November. The highest 24-hour rainfall total for a National Weather Service Cooperative station was 2.00 inches at Leavenworth 3SW, Leavenworth County, on the 26th. The greatest 24-hour rainfall total for a Community Collaborative Rain, Hail and Snow network station 1.28 inches at Courtland 0.1 SSE, Republic County, on the 27th. The greatest monthly precipitation totals for November: 4.23 inches at Leavenworth 3SW, Leavenworth County (NWS) and 2.05 inches at Erie, Neosho County (CoCoRaHS). Not all precipitation was in the form of rainfall. A total of 240 stations reported snowfall in November, with monthly totals ranging from trace amounts in southern Kansas to 17.3 inches at the CoCoRaHS station of Morrowville 4.8 SSW, Washington County.

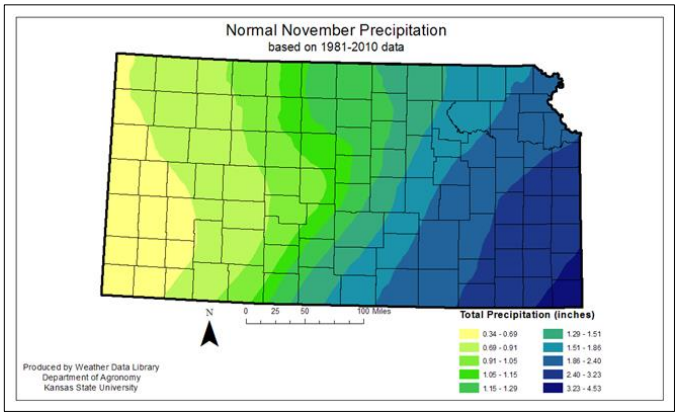
Information in this summary is taken from weekly information generated by Kansas State University Department of Agronomy along with data tables and maps. (Maps based on data from the Cooperative Observer and Kansas Mesonet, and provided by KSU Weather Data Library.) Weekly maps of precipitation information can be accessed at http://climate.k-state.edu/maps/weekly/.

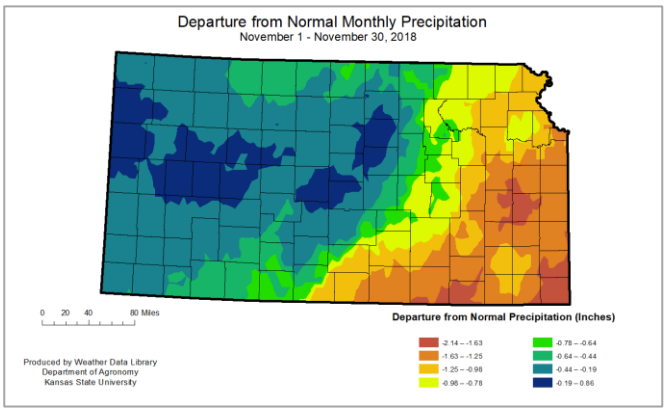
Kansas Climate Division Precipitation Summary (inches)

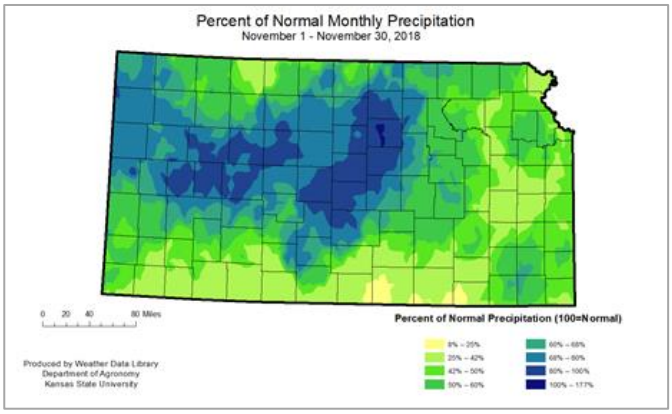
Climate Division	November 1-30, 2018			January 1-Nov 30, 2018			April 1, 2017- Nov 30 , 2018			Sept 1, 2018- Nov 30, 2018		
	Actual	Depart Normal	Percent Normal	Actual	Depart Normal	Percent Normal	Actual	Depart Normal	Percent Normal	Actual	Depart Normal	Percent Normal
Northwest	0.59	-0.23	72	22.82	2.03	110	21.43	2.94	116	5.26	1.36	135
West Central	0.63	-0.16	80	24.25	4.11	120	23.15	5.51	131	7.29	3.45	190
Southwest	0.35	-0.31	53	24.96	5.73	130	24.54	7.69	146	7.15	3.36	189
North Central	1.99	0.76	162	31.68	4.52	117	30.11	6.44	127	11.90	6.06	204
Central	1.86	0.62	150	31.75	3.39	112	30.19	5.78	124	12.71	6.82	216
South Central	0.87	-0.62	58	34.77	4.57	115	32.75	7.17	128	12.72	5.99	189
Northeast	1.77	0.00	100	32.83	-0.95	97	30.38	0.81	103	13.34	5.23	164
East Central	1.75	-0.42	81	30.82	-5.70	84	27.92	-3.68	88	11.58	2.67	130
Southeast	1.85	-0.74	71	38.64	-1.04	97	34.45	0.77	102	12.88	2.61	125
STATE	1.26	-0.16	89	30.45	2.10	107	28.51	4.00	116	10.54	4.19	166

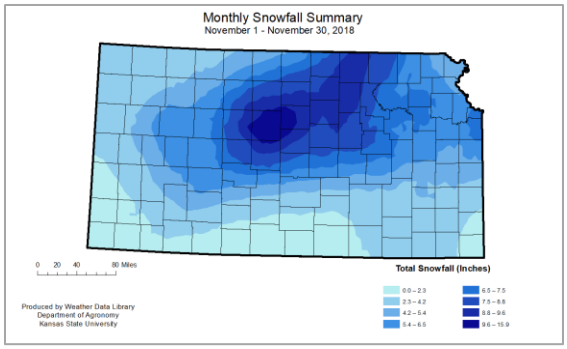
The maps below summarize precipitation. Climate maps are also available from the High Plains Regional Climate Center at https://hprcc.unl.edu/maps.php?map=ACISClimateMaps











Climate Summary-Temperature

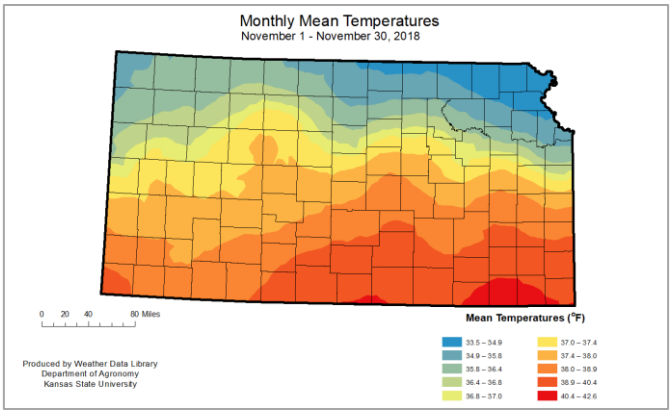
Despite some warm periods to the month, November temperatures were cooler than normal. State-wide average temperature for the month was 37.5 ^{o}F, which is 5.0 degrees cooler than normal. All climate divisions were cooler than normal. The Northeast Climate Division had the largest departure, with an average of 35.1 ^{o}F, or 7.1 degrees cooler than normal. The West Central Division came closest to normal with an average of 37.6 ^{o}F or 2.7 degrees cooler than normal. The variability showed in the range of temperatures. The warmest maximum temperature was 82 ^{o}F at Yates Center, Woodson County, on the 13th. The coldest minimum temperature at a NWS station was 1 ^{o}F, recorded at Greensburg, Kiowa County, also on the 13th. There were no record daily high maximum temperatures in the month, and 90 record daily low maximum temperatures. On the minimum temperature side, there was one record high minimum compared to 59 record low minimums.

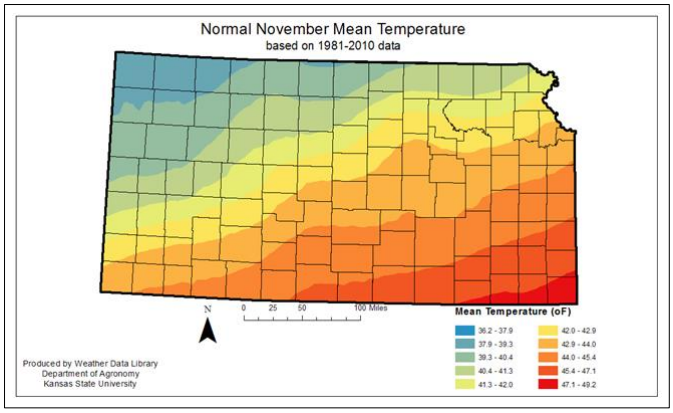
Information in this summary is taken from weekly information generated by Kansas State University Department of Agronomy along with data tables and maps. (Maps based data from the Cooperative Observer and Kansas Mesonet, provided by KSU Weather Data Library.) The weekly maps a glimpse at the temperature variation from normal. Weekly maps of information can be accessed at http://climate.k-state.edu/maps/weekly/.

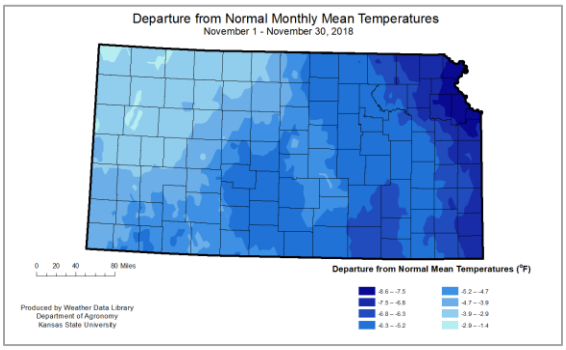
Climate Division	Kansas Climate Division Temperature Summary (^{o}F) November 2018							
	Maximum	Minimum	Average	Departure	High	Date	Low	Date
Northwest	49.9	22.4	36.1	-2.9	68	23	5	13
West Central	52.0	23.5	37.8	-2.7	70	29	3	13
Southwest	53.0	24.9	38.9	-3.9	74	29	3	13
North Central	47.3	25.0	36.1	-5.1	67	24	6	13
Central	49.1	26.3	37.7	-5.1	69	1	5	13
South Central	51.0	27.8	39.4	-5.2	71	15	1	13
Northeast	45.3	25.0	35.1	-7.1	65	23	7	27
East Central	46.9	27.3	37.1	-6.5	68	25	8	13
Southeast	50.5	28.6	39.5	-6.3	82	13	6	14
STATE	49.4	25.6	37.5	-5.0	82	13th	1	13th
Data Source: KSU Weather Library								

Severe storm reports were limited to extreme southeastern Kansas in November. There was one hail report and six reports of wind damage. Severe winter weather was the main feature for the month, with blizzard-conditions across most of the central and northern areas of the state on the 25th and 26th. Sadly, there was one fatality when a stranded motorist attempted to walk to safety and died from exposure.

The maps below summarize temperature. Climate maps are also available from the High Plains Regional Climate Center at https://hprcc.unl.edu/maps.php?map=ACISClimateMaps .



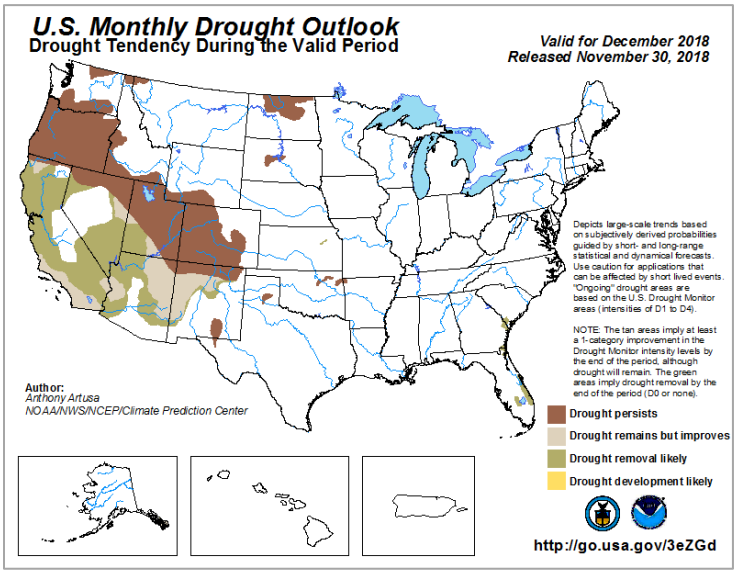


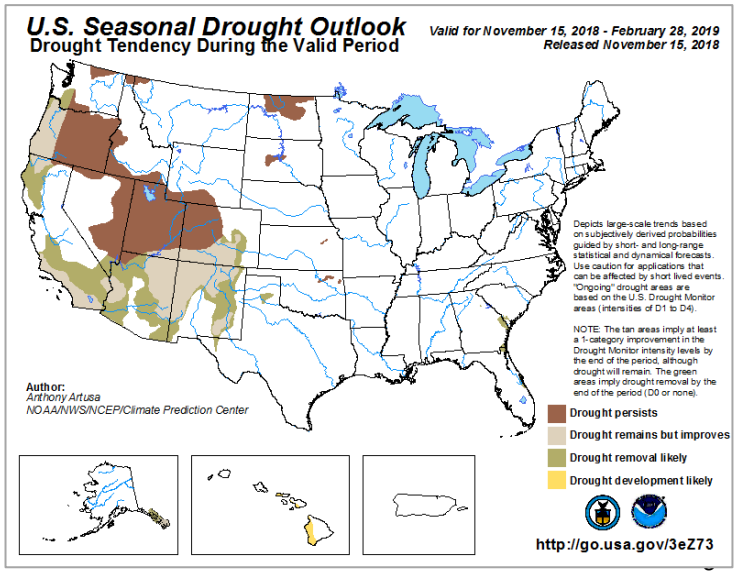


Future Outlook

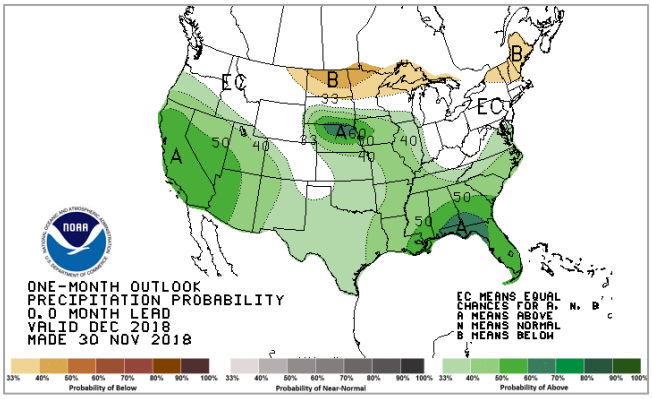
The Monthly Drought Outlook for December indicates drought conditions likely to improve in the small are of northeast Kansas where drought conditions remain at the end of November.

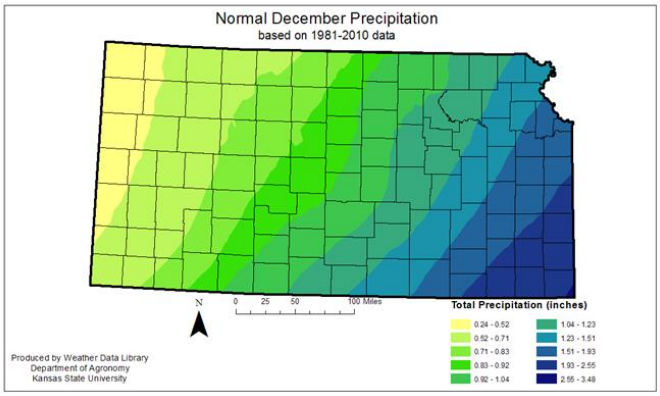
Seasonal Outlook (3-month) favors removal of the small area of drought remaining in eastern Kansas. The individual temperature and precipitation outlooks that contribute to these outlooks are available below. Others time intervals are also available from the climate prediction center.

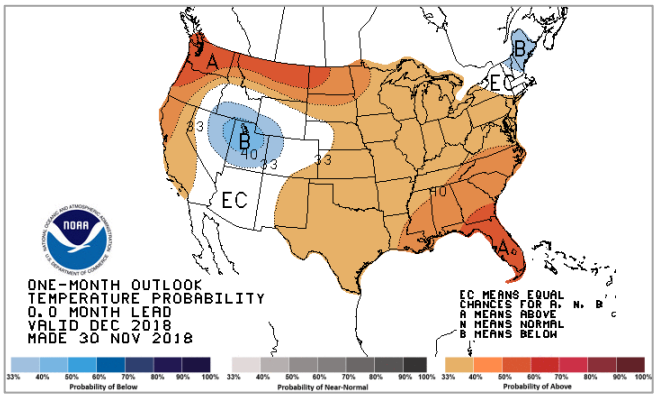


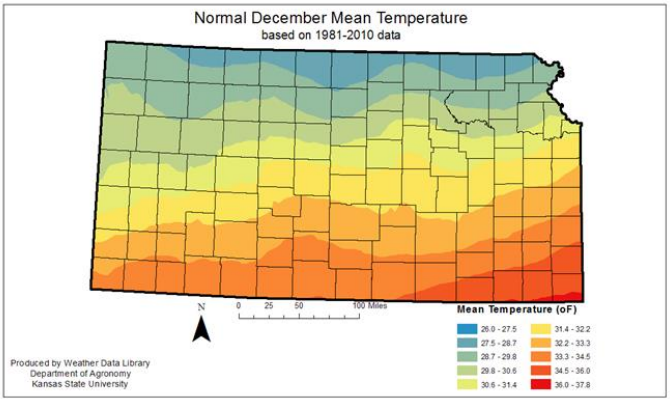


December outlook has increased chances for above normal precipitation across most of the state. However, given the low normal precipitation at this time of the year, continued improvement is likely to be slow. The temperature outlook is for warmer than normal temperatures across all but the western edges of the state.

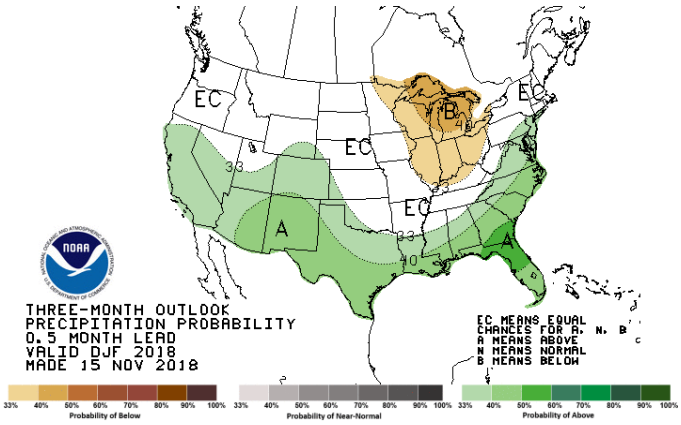


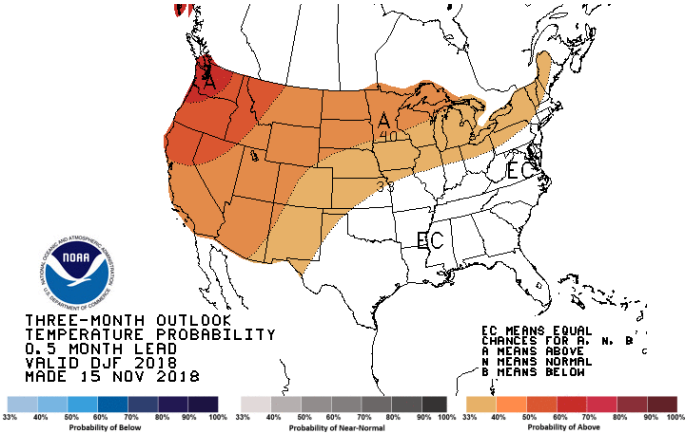






A mild winter could be in store for much of the United States this winter according to NOAA's Climate Prediction Center. The U.S. Winter Outlook for December through February favors above-average temperatures for the majority of Kansas with equal chances of below, above or normal precipitation. Additionally, El Nino has an 80 percent chance of developing according to, NOAA's Climate Prediction Center. The anticipated weak El Nino may influence the winter season by bringing wetter conditions across the southern United States, and warmer, drier conditions to parts of the North.





Additional outlooks for various timeframes are available from the national CPC for up to 13 months. (http://www.cpc.ncep.noaa.gov/products/predictions/90day/)

Water

Public Water Supply Conditions

Cities and rural water districts are encouraged to measure their current water supply as well as review and use their conservation and drought emergency plans as needed. Many updates and new plans are developed when drought conditions exist. Individual system stage designation and corresponding conservation measures are defined by each water supplier, so requirements to conserve and conservation measures are not uniform among public water suppliers. There are an increasing number of systems that restrict summertime outdoor water use to times of day of lower evaporation.

Surface Water Supply Conditions

Kansas River basin: Milford and Tuttle Creek reservoirs both continued to experience higher than normal inflows in November. Milford, Tuttle Creek, and Perry all maintained a substantial amount of water in their flood pools throughout the month, mostly from storage gained in October. November inflows to Clinton and Perry were very much near historic median. Flood storage evacuation from Milford, Tuttle Creek, and Perry was restricted the entire month due to near flood conditions in the Missouri River.

Marais des Cygnes basin: Melvern, Pomona, and Hillsdale reservoirs had seasonally normal inflows for November. Melvern and Hillsdale maintained some storage in the flood pool near the higher fall target elevations. Pomona was drawn down prematurely to near its winter target elevation to help facilitate work on extension of a boat ramp. Flows in the Marais des Cygnes River were normal to slightly elevated over the month.

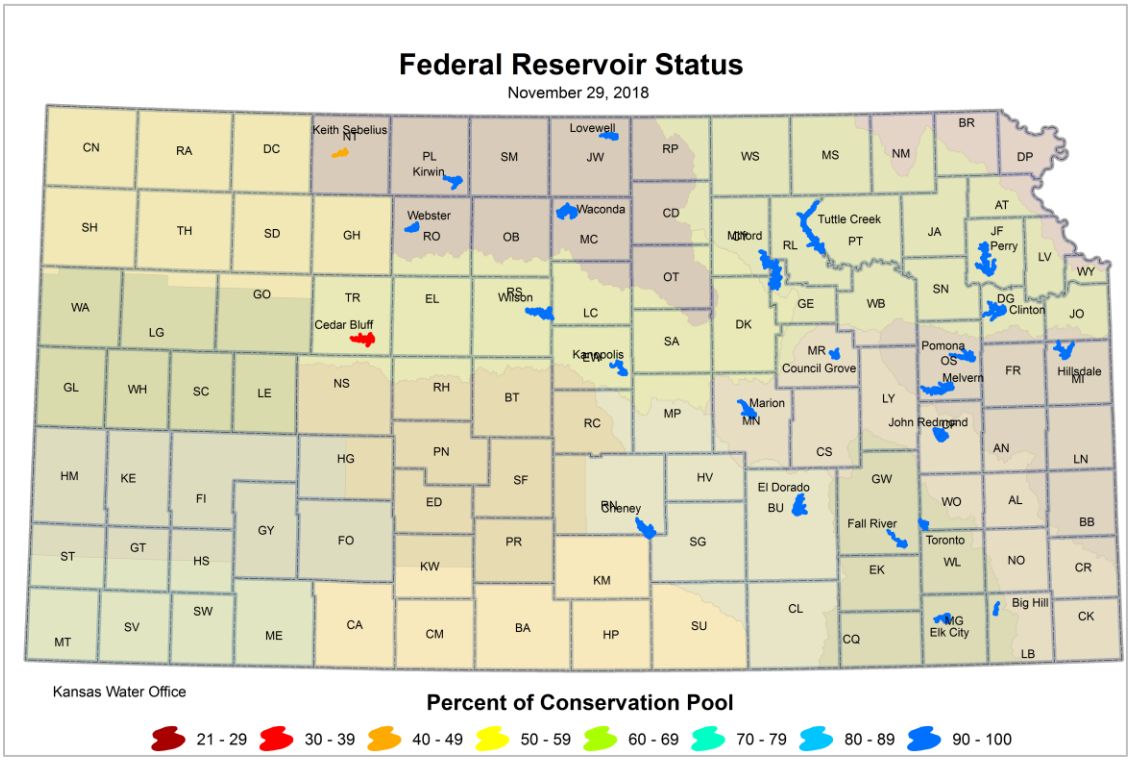
Cottonwood/Neosho basin: Inflows to Marion Reservoir were lower than the rest of the system and the pool elevation remained about 1.5 feet below conservation. Flood pool releases were necessary from Council Grove and John Redmond reservoirs throughout the month of November.

Verdigris basin: Inflows to Toronto, Fall River, Elk City, and Big Hill reservoirs were moderate to above normal in November. Stream flow in the Verdigris and Fall Rivers were maintained above normal due to flood pool releases and generally healthy tributary gains.

Saline basin: The elevation at Wilson Lake was maintained above normal pool in November. Inflow remained above normal and releases in excess of low flow settings were necessary to manage lake level.

Smoky Hill basin: The middle Smoky Hill River maintained higher than normal flows from baseflow and tributary gains in November. Kanopolis Lake made significant flood pool releases through the main service gates, about 11 foot decline in pool elevation over the month. The U.S. Army Corps of Engineers will draw the pool down below the top of conservation to facilitate maintenance work this winter. Cedar Bluff Reservoir also received some inflow and gained elevation over the month due to steady higher than normal inflow.

Surface Water Supply Conditions
Reservoir Storage



Kansas Federal Reservoir Conservation Pool Levels

Reservoir	Top of Multipurpose / Conservation Pool (Feet MSL)	Multipurpose/Conservation Pool Elevation (Feet MSL)	Change from Top of Pool (Feet)	Percent of Conservation Pool Full
Kansas River Basin		**11/29/2018 6:00 AM**		
Norton[1]	2304.3	2293.39	-10.91	45.5
Harlan County, NE	1945.73	1939.78	-5.95	76.4
Lovewell[1]	1582.6	1582.35	-0.25	98.0
Milford[1]	1144.4	1144.34	-0.06	99.8
Cedar Bluff	2144	2122.14	-21.86	37.6
Kanopolis[1]	1463	1462.71	-0.29	98.2
Wilson[1]	1516	1516.55	0.55	100.0
Webster[1]	1892.5	1892.64	0.19	100.0
Kirwin[1]	1729.3	1730.30	1.05	100.0
Waconda[1]	1455.6	1456.49	0.89	100.0
Tuttle Creek[1]	1075	1084.26	9.26	100.0
Perry[1]	891.5	895.32	3.82	100.0
Clinton[1]	875.5	874.55	-0.95	94.3
Melvern[1]	1036	1037.53	1.53	100.0
Pomona[1]	974	972.48	-1.52	89.5
Hillsdale[1]	917	917.94	0.94	100.0
Arkansas River Basin		**11/29/2018 8:00 AM**		
Cheney	1421.6	1422.04	0.44	100.0
El Dorado	1339	1339.38	0.38	100.0
Toronto[1]	901.5	901.87	0.37	100.0
Fall River[1]	948.5	949.16	0.66	100.0
Elk City[1]	796	796.40	0.40	100.0
Big Hill	858	858.02	0.02	100.0
Council Grove[1]	1274	1274.24	0.24	100.0
Marion[1]	1350.5	1348.97	-1.53	89.0
John Redmond[1]	1039	1041.54	0.54	100.0

[1]Lake level management plan in place — Source: U.S. Army Corps of Engineers

Note: The conservation pool is the water storage for non-flood purposes of the reservoir, set by the elevation of the top of the pool.

Harmful Blue-Green Algal Blooms (lake water safety)

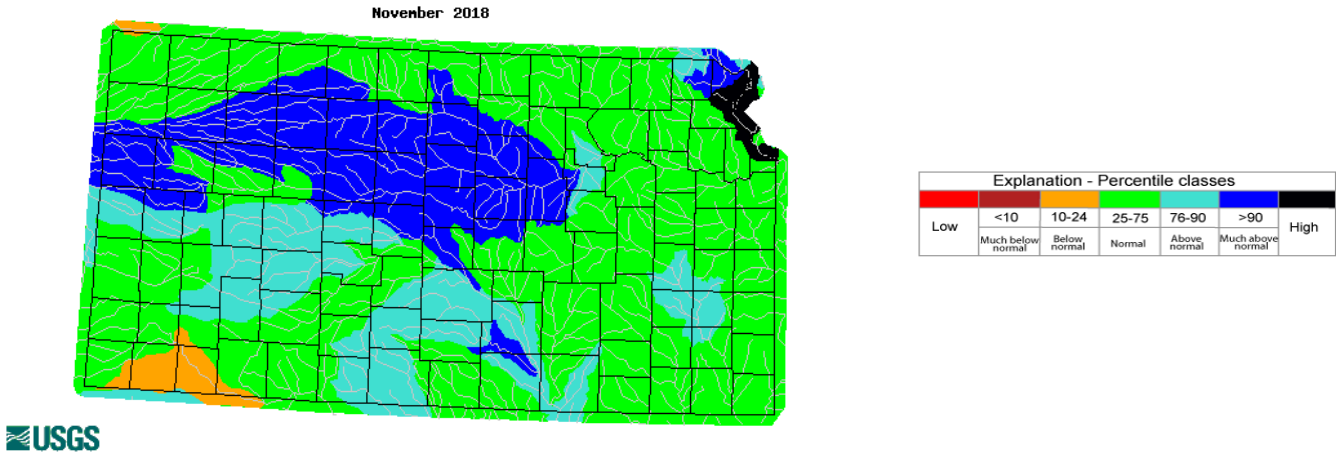
KDHE issues two levels of public health protection notifications for blue-green algae (BGA) Blooms: a Public Health Watch and Public Health Warning. Public Health Watch–Notifies public that a hazardous condition may exist, that the water may be unsafe for humans and animals and contact with the water is discouraged. Public Health Warning–Notifies public that conditions are unsafe, that contact with the water should not occur, and all conditions of Public Health Watch remain in effect. More information can be found at http://www.kdheks.gov/algae-illness/index.htm.

The 2018 HAB monitoring ended October 31st. At that time two water bodies remained in active bloom: Frazier Lake, in Grant County was at a Warning status; and South Lake, in Johnson County was at a Watch status. The next harmful algal bloom season will begin again on April 1, 2019.

Streamflow Conditions

WaterWatch summarizes streamflow conditions in a region (state or hydrologic unit) in terms of the long-term typical condition at stream gages in the region. In general, a streamflow which is greater than the 75 percentile is considered *above normal*, a streamflow which is between 25 and 75 percentiles is considered *normal* and a streamflow which is less than the 25 percentile is considered *below normal*. Color codes are for basins with streamflow averages less than 25 percent of historic values. This comparison aids in evaluating water resources conditions for a time period.

November Streamflow compared to historical streamflow is reflected in the map below.



Water Right Administration/Minimum Desirable Streamflow (MDS)

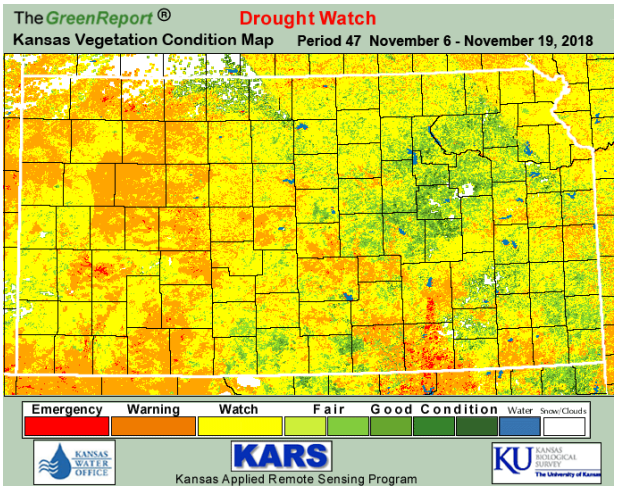
Minimum Desirable Streamflow (MDS) is not being administered in Kansas. MDS administration requires water rights junior to MDS, usually with priority dates after April 12, 1984, to stop diverting water. Administration is ordered when streamflow drops below MDS for more than seven days. To rescind orders at most gages, daily average flow must be above MDS for 14 days.

The table below provides a snapshot of conditions for streams of interest to the Kansas Department of Agriculture, Division of Water Resources.

Streamflows as of November 26, 2018			
Gaging Station	**Current Flow**	**Nov MDS**	**Comment**
Delaware River near Muscotah	ice	10	Admin ceased September 5, 2018
Rattlesnake Creek near Macksville	2	5	No surface water diversions junior to MDS above gage
Rattlesnake Creek near Zenith	13	10	No surface water diversions junior to MDS above gage
South Fork Ninnescah River near Pratt	9	10	No surface water diversions junior to MDS above gage

Vegetation and Soil Moisture

Vegetative Conditions



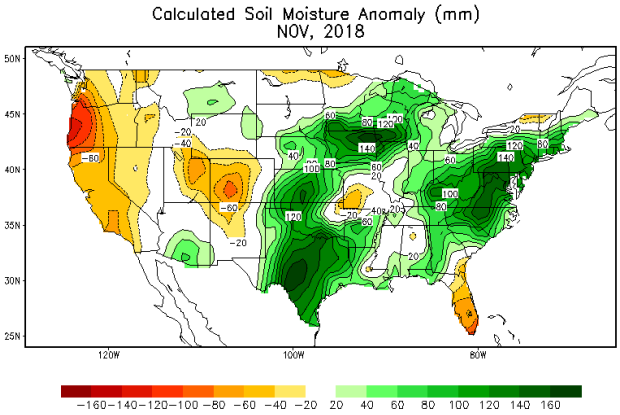
The Vegetative Condition map provides current conditions related to drought effects on vegetation. It is produced using satellite data. Areas in yellow, orange and red indicate areas of vegetative stress. The green areas are considered to be in good or excellent condition.

Soil Moisture and Rangeland

USDA Crop Progress and Condition provide a summary of the climatic effects on soil, and livestock feed. The Kansas report by USDA's National Agricultural Statistics Service for the state as a whole for the week ending November 25, 2018 indicates topsoil moisture supplies rated 0 percent very short, 2 short, 83adequate, and 15 surplus. Subsoil moisture supplies rated 0 percent very short, 5 short, 86 adequate, and 9 surplus.

Pasture and Range Report**:** Pasture and range conditions rated 3 percent very poor, 9 poor, 33 fair, 50 good, and 5 excellent.

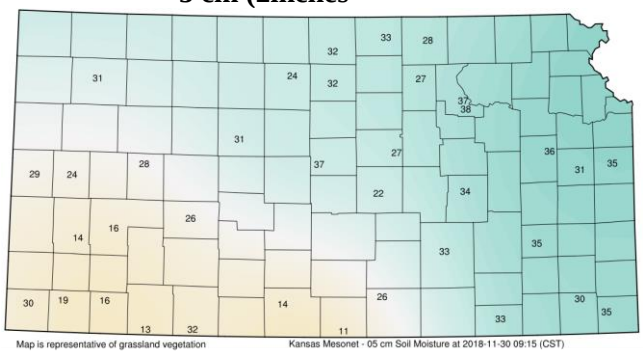
The Climate Prediction Center (CPC), also monitors soil moisture and predicts future soil moisture. Anomalies are defined as deviations from the 1971-2000 monthly climatology. The soil anomaly is provided below indicates deficit soil moisture for most of Kansas. (.http://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Soilmst/Soilmst.shtml)



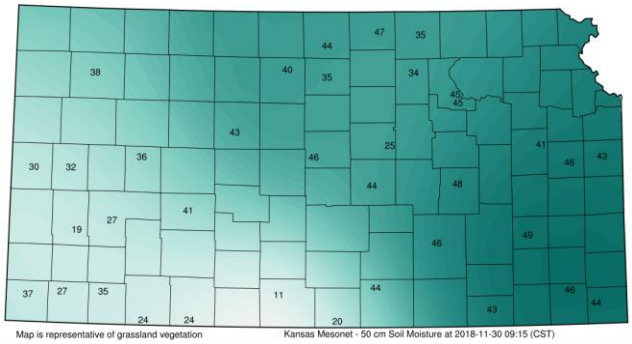
Kansas soil moisture monitoring occurs through Kansas State University Mesonet at four depths, 5 cm, 10 cm, 20 cm and 50 cm measuring percentage of saturation and volumetric water content at about 36 stations. Installation of sensors began in mid-2017 and were completed early 2018. Maps and data are found at http://mesonet.k-state.edu/agriculture/soilmoist/ . Maps of water content at 5cm and 50 cm are compared below for November 30, 2018.

Soil Water Content Nov. 30, 2018

5 cm (2inches



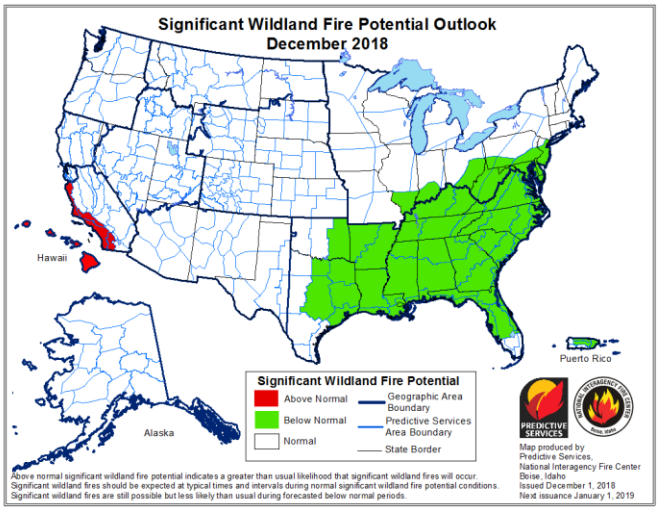
50 cm (20 inches)

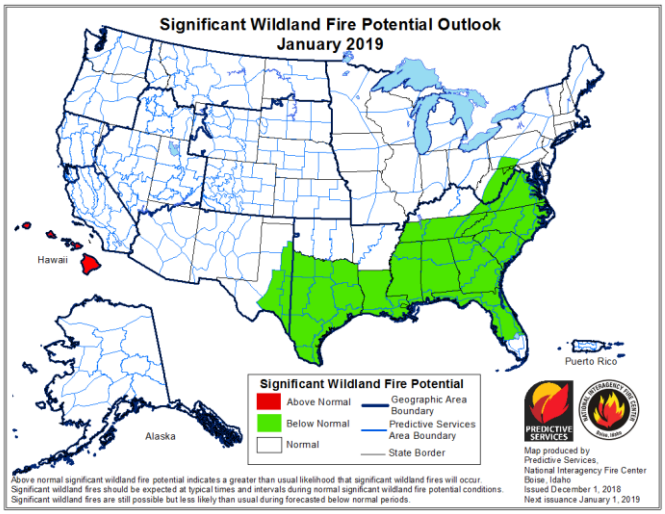


Fire

Periods of concern will be wind events coupled with low humidity that impact fire activity. Kansas Forest Service provides a grassland fire danger index at**:** http://www.kansasforests.org/fire_management/grasslandfireindex.html .

Significant Wildland Fire Potential Outlook is issued monthly for the United States, https://www.predictiveservices.nifc.gov/outlooks/monthly_seasonal_outlook.pdf .





Kansas Climate Summary

The Kansas Weekly Climate Summary and Drought Report are compiled at least monthly, more frequently when conditions warrant, by the KWO. Information from various federal, state, local and academic sources is used. Some of the data is preliminary and subject to change once final data is available. The KWO web site, http://www.kwo.ks.gov/reports2/climate-and-drought-monitoring-response , contains additional drought information including links to other agencies with drought information and past issues of the Kansas Climate Summary and Drought Report. Kansas State Climatologist, Mary Knapp, is the primary source of the narrative on weather. She works closely with meteorologists throughout the state and region. Details of current conditions at Evapotranspiration (ET) and Mesonet sites across Kansas are available at http://mesonet.k-state.edu/

RESOURCES and REFERENCES

Kansas climate data is provided by Kansas State University, Weather Data Library through the Kansas Mesonet. (http://www.ksre.k-state.edu/wdl/). Soil moisture data was added in 2018 (http://mesonet.k-state.edu/agriculture/soilmoist)

The U.S. Drought Monitor, from the National Drought Mitigation Center at the University of Nebraska-Lincoln, provides a "big picture" perspective of conditions across the nation. 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 one indicator used in the U.S. Drought Monitor.

The High Plains Regional Climate Center (https://hprcc.unl.edu/) has precipitation and temperature summary maps available at the state, region and nation.

The U.S. Geological Survey (USGS) Drought Watch provides information average streamflow measured at long-term gaging stations and compares them to normal flows.

The Kansas Department of Agriculture-Division of Water Resources monitors stream flow using the USGS gages for determination of administrative needs. Administration may be needed due to Minimum Desirable Streamflow (MDS) requirements, impairments and reservoir release protection. (https://agriculture.ks.gov/divisions-programs/dwr/water-appropriation/minimum-desirable-streamflow.)

The water levels of the federal 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.ks.gov .

The Kansas Applied Remote Sensing Program (KARS) at the University of Kansas produces a Kansas Green Report each week during the growing season. For a full set of national and regional ***GreenReport***® maps, go to: http://www.kars.ku.edu/products/greenreport/greenreport.shtml. This Kansas Vegetation Drought Response Index map is developed weekly by the Kansas Biological Survey using state drought triggers as its key. In addition the VegDRI maps may be found at http://vegdri.unl.edu/

The National Weather Service (NWS) provides fire weather products and services for Kansas that include the Rangeland Fire Danger Index, Fire Weather Forecasts, Red Flag Watches/Warnings and Spot Forecasts. The five NWS offices that serve Kansas websites may be accessed from the NWS Offices' page.

The Monthly and Seasonal Drought Outlooks, developed by the NOAA Climate Prediction Center, assess the likelihood for improvement, persistence or deterioration in drought conditions for areas currently experiencing drought as identified by the U.S. Drought Monitor. (http://www.cpc.ncep.noaa.gov/) Also see: http://www.noaa.gov/.

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. The 2007 Municipal Water Conservation Plan Guidelines and the Drought Vulnerability Assessment Report, both by KWO, provide guidance regarding drought preparedness and response. These are available at http://www.kwo.ks.gov/reports2/climate-and-drought-monitoring-response.

USDA Drought Programs and Assistance website (https://www.usda.gov/topics/disaster/drought/usda-drought-programs-and-assistance) listing the various USDA programs and agencies to assist with drought issues.

The National Interagency Coordination Center in Boise, Idaho, produces wildfire potential outlook maps monthly. (https://www.predictiveservices.nifc.gov/outlooks/outlooks.htm)

Please contact Diane Knowles at the Kansas Water Office (785) 296-3185 or diane.knowles@kwo.ks.gov should you have any questions or suggestions.

APPENDIX A

November 2018 Summary	Precipitation (inches)			Temperature °F			
						Extreme (Date)	
Station[1]	Total	Departure	Percent Normal	Mean	Departure	Highest	Lowest
West							
Burlington, CO	0.66	0.07	112%	36.7	-1.5	66 (22)	7 (12)
Dodge City	0.51	-2.50	17%	39.4	-3.8	68 (15)	6 (13)
Garden City	0.11	-0.44	20%	37.5	-4.2	66 (15)	3 (13)
Goodland	0.64	-0.07	90%	37.3	-1.7	67 (22)	10 (18,12)
Guymon, OK	0.11	-0.42	21%	41.9	-3.7	75 (28)	13 (13)
Hill City	0.68	-0.27	72%	38.2	-2.5	68 (15)	10 (13)
Lamar, CO	0.17	-0.21	45%	39.9	-1.0	69 (24,2)	14 (13)
McCook, NE	1.62	0.37	130%	36.0	-2.2	69 (22)	8 (18)
Springfield, CO	0.35	-0.23	60%	37.5	-4.3	69 (28)	8 (12)
Central							
Concordia	1.75	0.64	158%	36.6	-5.0	63 (23,22)	10 (13)
Hebron, NE				35.9	-3.6	64 (22)	8 (18)
Medicine Lodge	0.58	-0.35	62%	40.8	-4.7	71 (15)	9 (13)
Ponca City, OK	0.06	-1.75	3%	42.7	-5.0	73 (24)	12 (13)
Salina	1.52	0.27	122%	38.3	-5.6	65 (23)	11 (13)
Wichita (ICT)	0.81	-0.62	57%	40.7	-4.7	70 (24)	12 (13)
East							
Bartlesville, OK	1.04	-1.64	39%	41.5	-6.5	70 (24)	12 (14)
Chanute	2.23	-0.27	89%	40.4	-5.9	68 (24)	13 (13)
Falls City, NE	0.49	-1.47	25%	33.5	-7.5	62 (22)	6 (27)
Johnson Co. Exec. Apt	0.88	-1.61	35%	36.1	-7.9	61 (24,22)	11 (13,10)
Joplin, MO	2.02	-1.76	53%	41.3	-7.1	70 (24)	9 (14)
Kansas City (MCI), MO	1.59	-0.56	74%	35.6	-8.0	63 (22)	9 (10)
St. Joseph, MO	0.42	-1.13	27%	34.5	-7.4	63 (22)	7 (27)
Topeka (TOP)	1.23	-0.62	66%	37.3	-6.5	64 (24,22)	12 (10)

1. Airport Automated Observation Stations (NWS/FAA)

2. Departure from 1981-2010 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