Issue 830

K-STATE Research and Extension

Extension Agronomy

eUpdate

12/04/2020

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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1. Sulfur deficiency in wheat

In recent years, sulfur (S) deficiency in wheat has become common in many areas of Kansas, particularly in no-till wheat. The likely reasons for this is a reduction in sulfur additions to the crop from atmospheric deposition (there is less S in the air now) and cooler soil temperatures as a result of no-till which slows S mineralization in the soil. Some crops in the rotation, such as soybean, can also take up significant amounts of S resulting in an S deficit for the following wheat crop.

Historically, S deficiency was most common on high-yielding crops grown on irrigated, sandy soils that are low in organic matter and subject to leaching. However, due to reasons discussed above, an increasing number of finer-textured soils have shown S deficiency in recent years.

Identification of S deficiency

The photos below are good representations of S deficiency in wheat. Generally, S-deficient wheat is yellow and stunted and is observed in patches in the field, especially in areas where there has been previous soil erosion or soil movement (Figure 1). The patchy S-deficient areas of the field are often found on hilltops or sideslopes where erosion has occurred and soil organic matter is reduced, or where leaching is more pronounced. Wheat in areas where topsoil was removed or significant cuts were made (i.e. terraced or leveled fields) also commonly shows symptoms.

Figure 1. Patches of sulfur deficiency in a wheat field. Photo by Dave Mengel, K-State Research and Extension.

Sulfur deficiency in growing crops is often mistaken for nitrogen (N) deficiency. However, unlike N deficiency where older leaves show firing and yellowing, with S deficiency, the pale yellow symptoms often appear first on the younger or uppermost leaves. Wheat plants with S deficiency eventually become uniformly chlorotic (yellow leaf tissue; Figure 2).

Figure 2. Close-up of sulfur deficiency in wheat. The wheat is exhibiting yellowing (chlorosis)

which is a sign of insufficient sulfur. Photo by Dorivar Ruiz Diaz, K-State Research and Extension.

Sulfur deficiencies in wheat have been showing up early in the spring, shortly after green-up, before organic S is mineralized from soil organic matter, and before wheat roots can grow into the subsoil to utilize any available S (sulfate) accumulations. Deficiencies of S are often difficult to identify because the chlorosis is not always obvious. Crops lacking S also may be stunted, thin-stemmed, and spindly. In the case of wheat and other cereal grains, maturity is delayed. Winter annual weed competition is also enhanced due to the slower growth and lack of good tillering.

At present, many fields in north central and northeast Kansas have an established history of S deficiency for wheat. In this situation, rather than waiting for symptoms to appear in the spring, farmers may want to consider a winter topdress application of S as a preventive measure.

Forms of sulfur in soil

The majority of S in soils is present in organic forms in surface soils and as sulfate (SO_4^{2-}), an inorganic form. Sulfate is relatively soluble, so it tends to leach down into the subsoil. In many of our Kansas soils, it will accumulate in the B horizon (subsoil) in two forms. Clay surfaces and coatings will retain some sulfate, and sulfate will also be present in the subsoil of many Kansas soils as gypsum (calcium sulfate).

Testing soil for sulfur

There is a soil test for available sulfate-S in the soil profile. For proper interpretation of this test, soil organic matter, soil texture, the crop to be grown, and the expected yield level all need to be considered. Accurate estimates of S needs cannot be made from a surface sample alone. Since sulfate is mobile, sampling to a **24-inch depth** is important. However, due to the relatively high demand for S during the rapid vegetative growth phase of wheat, and relatively shallow rooting by the wheat crop at this time, the S measured in the deeper, subsoil levels by the test may not be available to wheat in the early spring, especially where soils are cold.

Choosing a fertilizer material

There are many S-containing fertilizer materials. Several dry materials are available that can be blended with dry phosphorus or nitrogen fertilizers for winter/spring topdressing. However, some of these products are best used in pre-plant applications.

Dry fertilizers

- **Elemental S** (typically 90-95 percent S) is a dry material marketed by several manufacturers. Before it becomes available for plant uptake, elemental S must first be oxidized by soil microorganisms to sulfate. This can be a slow process when surface-applied. As a result, elemental S is not well suited for corrective applications to S-deficient wheat in the spring, due to the time required for oxidation to sulfate.
- **Ammonium sulfate**, AMS (21-0-0-24S) is a dry material that is a good source of both N and S. However, it has high acid-forming potential and soil pH should be monitored. Ammonium

sulfate is a good source to consider for either pre-plant or topdressing to correct existing sulfur deficiencies.

- **Gypsum** (analysis varies) is calcium sulfate and is commonly available in a hydrated form containing 18.6 percent S. This material is commonly available in a granulated form that can be blended with other materials. Since it is a sulfate source, it would be immediately available and is another good source for spring topdressing. However, gypsum is not as water soluble as many fertilizer materials such as ammonium sulfate.

- **New N-P-S products** such as Microessentials, 40-rock, and others that are typically ammonium phosphate materials formulated with S, and in some cases micronutrients such as zinc. In most of these products the S is present as a combination of elemental S and sulfate.

Liquid fertilizers

- **Ammonium thiosulfate,** ATS, (12-0-0-26S) is the most popular S-containing product used in the fluid fertilizer industry as it is compatible with N solutions and other complete liquid products.

- **Potassium thiosulfate**, KTS, (0-0-25-17S) is a clear liquid product that can be mixed with other liquid fertilizers.

Topdressing with thiosulfate and UAN can be done early, before Feekes 5 growth stage (green up), and at temperatures below 70 degrees F. Be aware that some leaf burn may be expected with some of these liquid fertilizers. These products would be good sources for pre-plant application as well.

Supplemental resources

- Sulfur in Kansas *(*MF 2264), http://www.ksre.ksu.edu/bookstore/pubs/MF2264.pdf
- For estimations of required application rates of S - Soil Test Interpretation and Fertilizer Recommendations, (MF2586) http://www.ksre.ksu.edu/bookstore/pubs/mf2586.pdf

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2. Update on drought conditions in Kansas - December 4, 2020

Precipitation summary

For the week ending on December 1, 2020, statewide precipitation averaged 0.56 inches, 206 percent of normal. The heaviest precipitation was centered in the Northeast, but trailed to the southwest. (Figure 1). The highest precipitation total reported for the week was 2.71 inches at Fostoria 7NW, Pottawatomie County. Not surprisingly, with additional amounts above an inch, the Northeast Division is the wettest for the week with an average of 1.37 inches, 391 percent of normal (Figure 2). The Northwest Division was the driest with a divisional average of zero. The West Central Division also missed out on most of the precipitation, with a divisional average of 0.05 inches, 38 percent of normal.

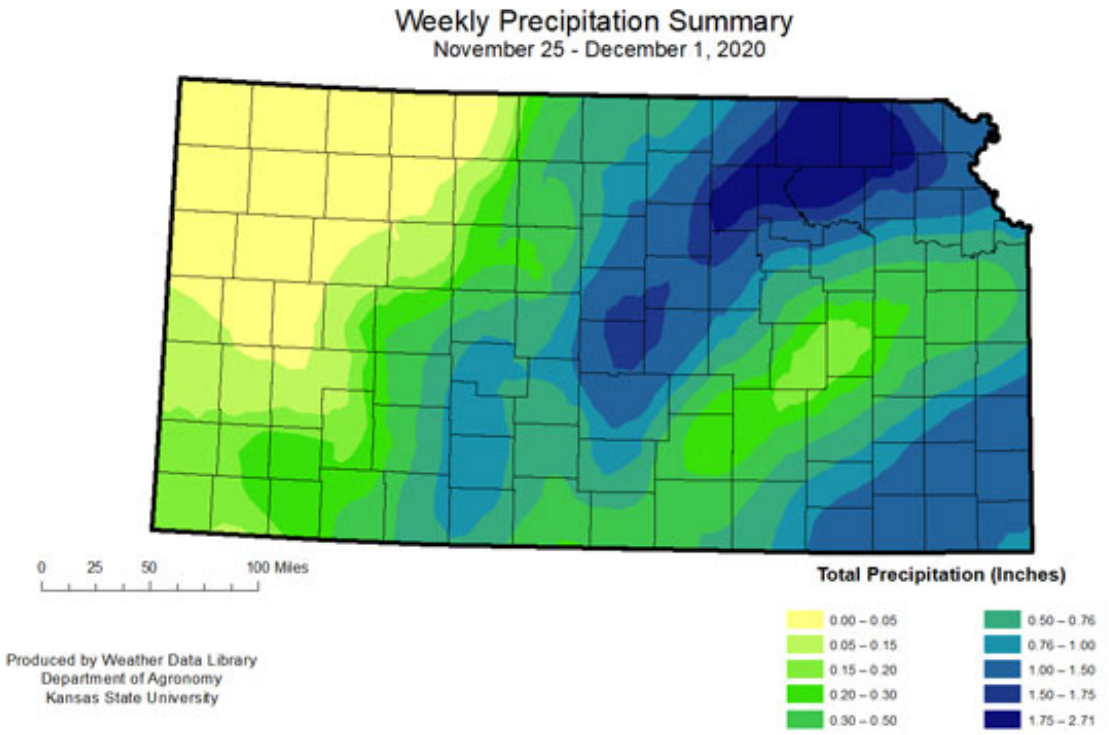

Figure 1. Total precipitation (inches) recorded for the week of November 25 – December 1, 2020. Map by the Kansas Weather Data Library.

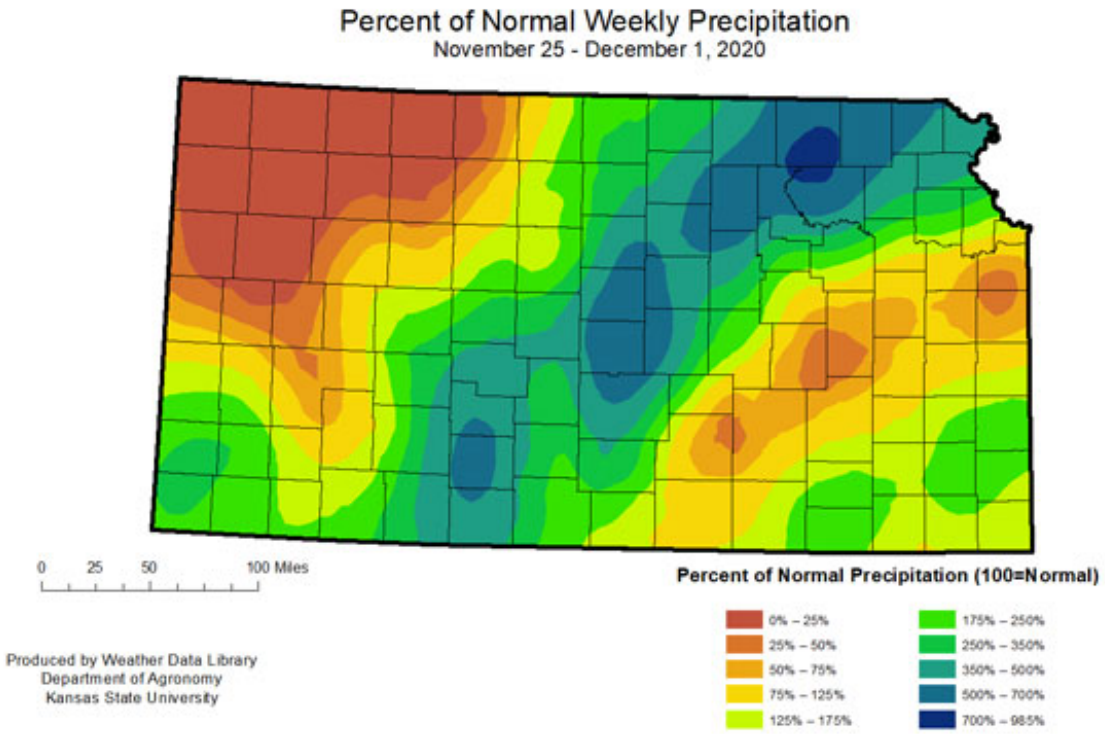

Figure 2. Percent of normal precipitation for the week of November 25-December 1, 2020. Values less than 100 indicate below normal amounts. Map by the Kansas Weather Data Library.

Temperature summary

The week averaged slightly warmer than normal temperatures. There was a 61 °F temperature swing during the period with the highest reading 64°F reported at Atwood, Rawlins County, on Nov. 29 and Coffeyville Airport, Coffey County, on the 27th. The coldest temperature reported was 3°F at Oakley 4W, Logan County, on the 30th. The statewide temperature averaged 37.0 °F for the week, 0.9 degrees warmer than normal (Figure 3). The North Central Division was the warmest with an average of 36.6 °F, 2.7 degrees warmer than normal. The West Central Division was the coolest at 33.6 °F, 0.7 degrees cooler than normal.

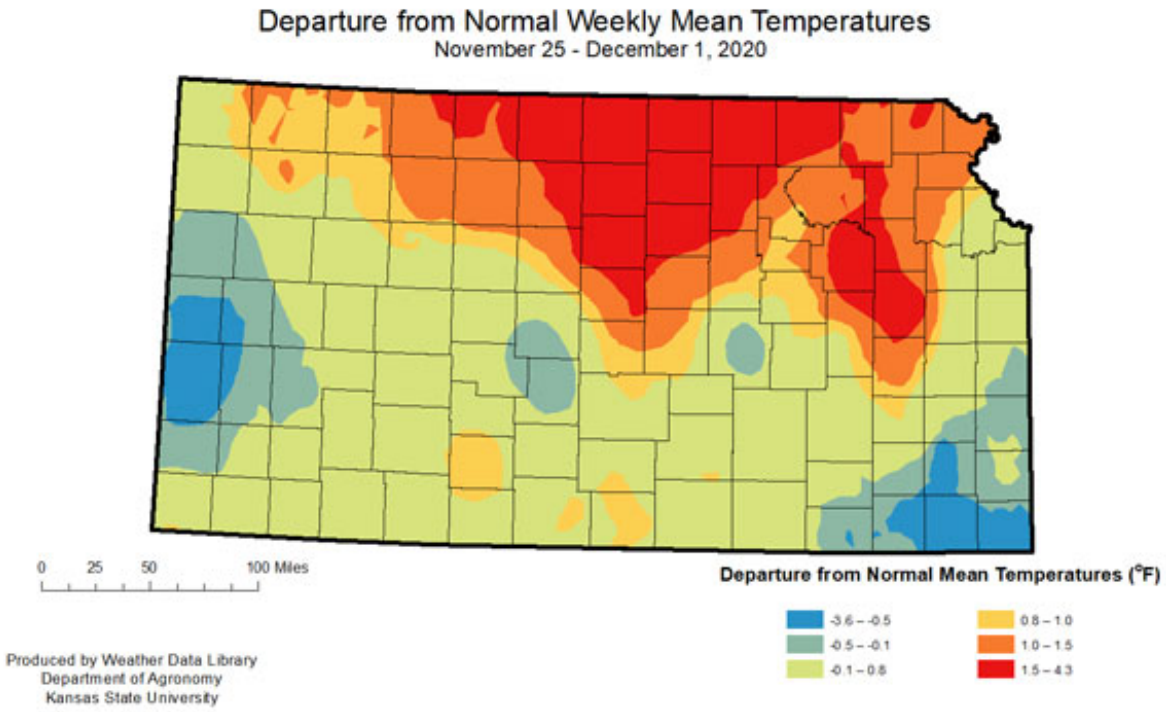

Figure 3. Departure from normal weekly mean temperatures for week of November 25 – December 1, 2020.

Change in drought status for Kansas

Given the widespread precipitation, there was a shift of drought coverage in the Drought Monitor. There was improvement in the North Central, Central and Northeast divisions with decreases in moderate and severe coverage (Figure 4 and Figure 5). There was a small reduction in abnormally dry conditions in the Southeast and South Central divisions where some of the greatest precipitation totals were reported. The Southwest Division saw some expansion of the severe and extreme drought categories. Lighter winds than the previous week, coupled with temperatures closer to normal, resulted in near-average water demand across the state during the period (Figure 6).

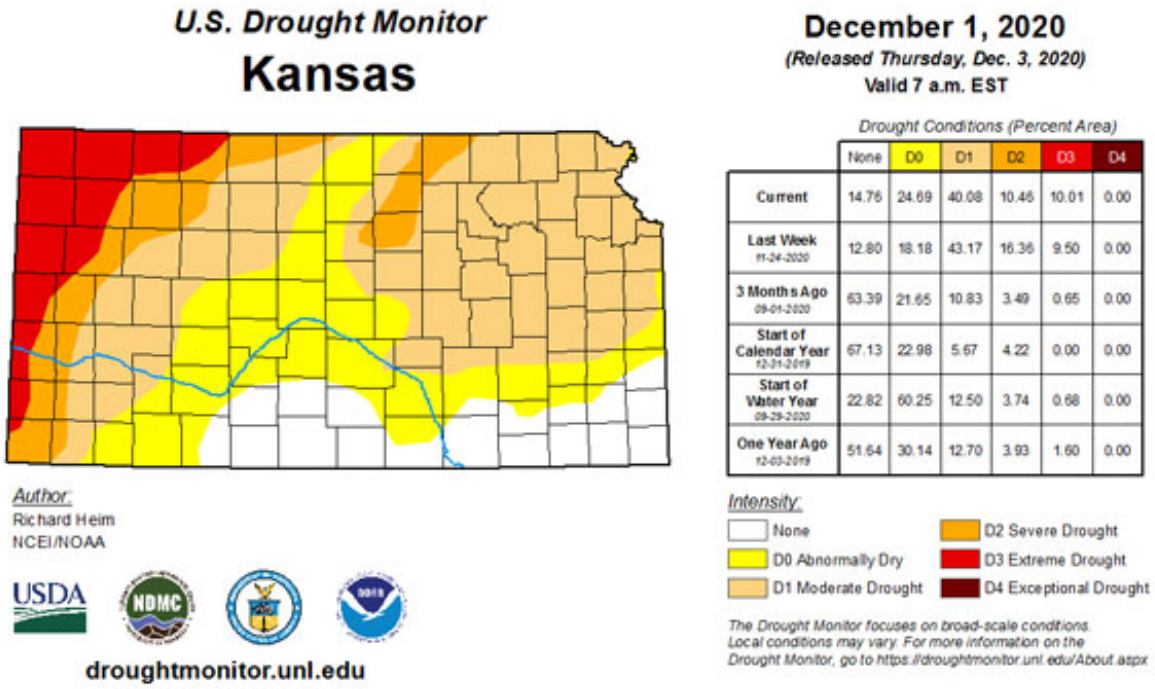

Figure 4. Current weekly drought status (U.S. Drought Monitor).

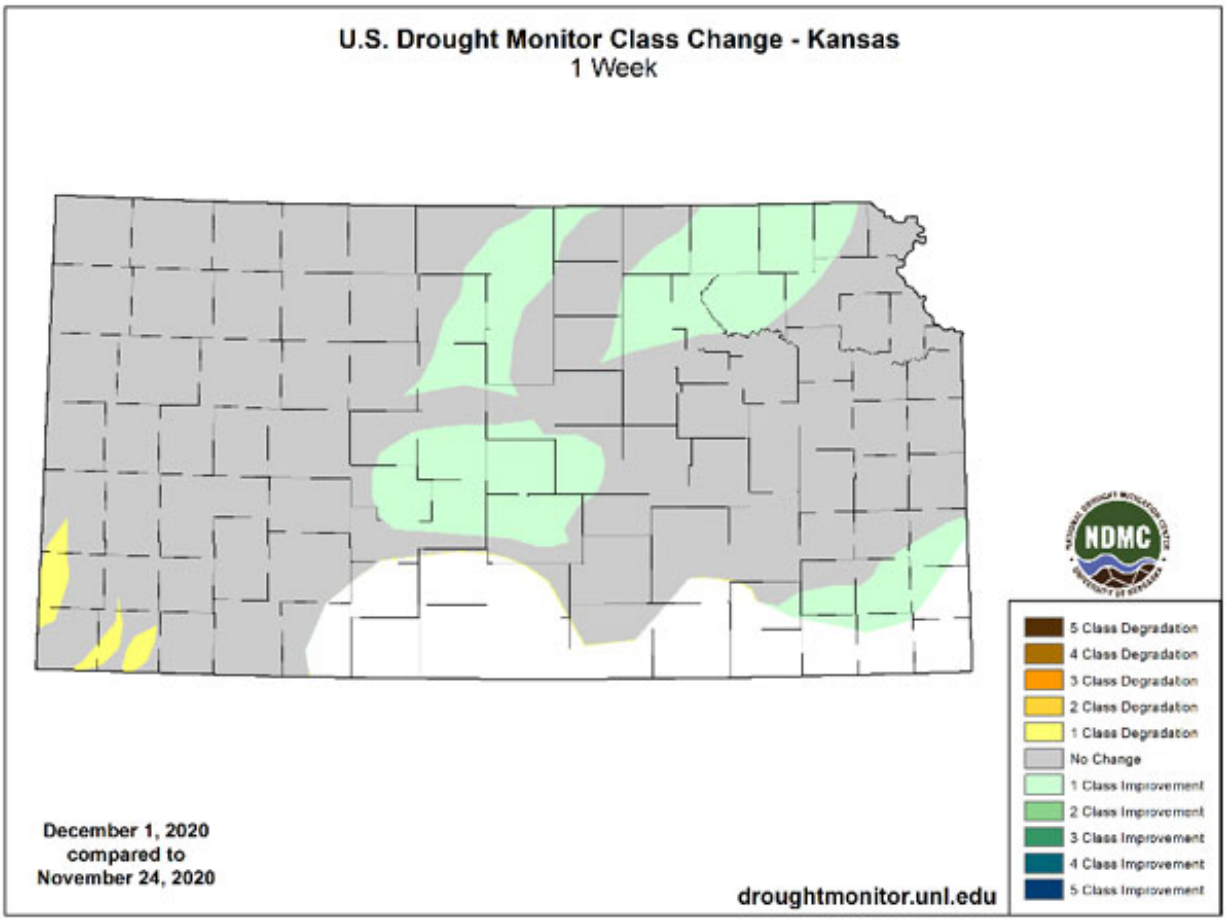

Figure 5. Change in weekly drought status (U.S. Drought Monitor).

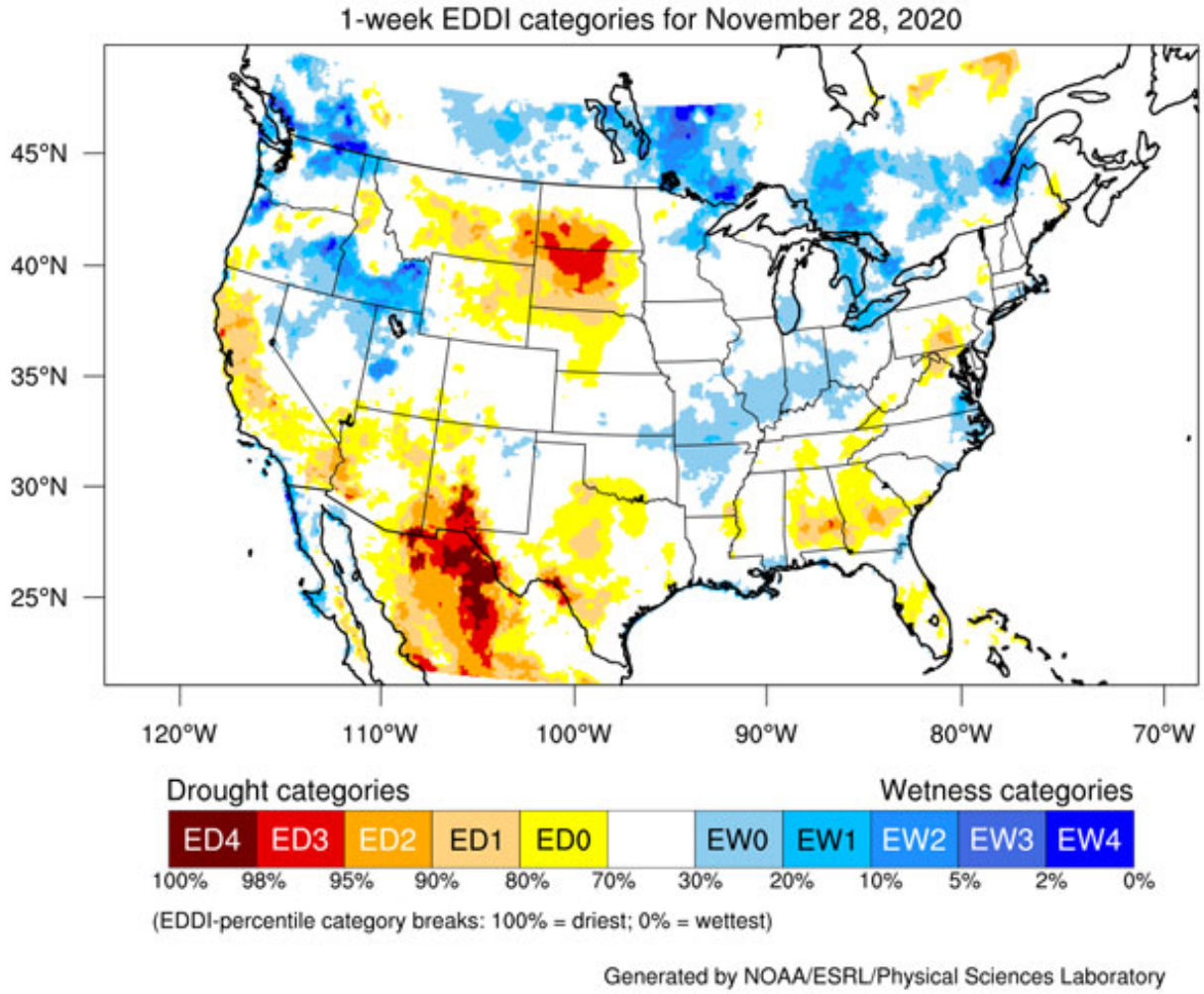

Figure 6. Evaporative Drought Demand Index factoring evaporative demand in respect to wind and moisture availability (NOAA, https://psl.noaa.gov/eddi/).

Looking ahead in December

In the upcoming week, moisture will be limited (Figure 7), with measurable precipitation expected only in the southeast part of the state. Most of this is likely to occur in the first part of the period, as the current winter storm pulls eastward. Moisture from this system, which came after the Tuesday cut-off period, will be included in the drought analysis for next week. A return to drier/warmer weather is expected beyond next week with a chance of below-normal precipitation and above-normal temperatures statewide (Figure 8). As we move into December, average precipitation across the west continues to decrease, while remaining steady in the east. Outlooks for the entire month of December favor above normal temperatures and below normal precipitation statewide (Figure 9).

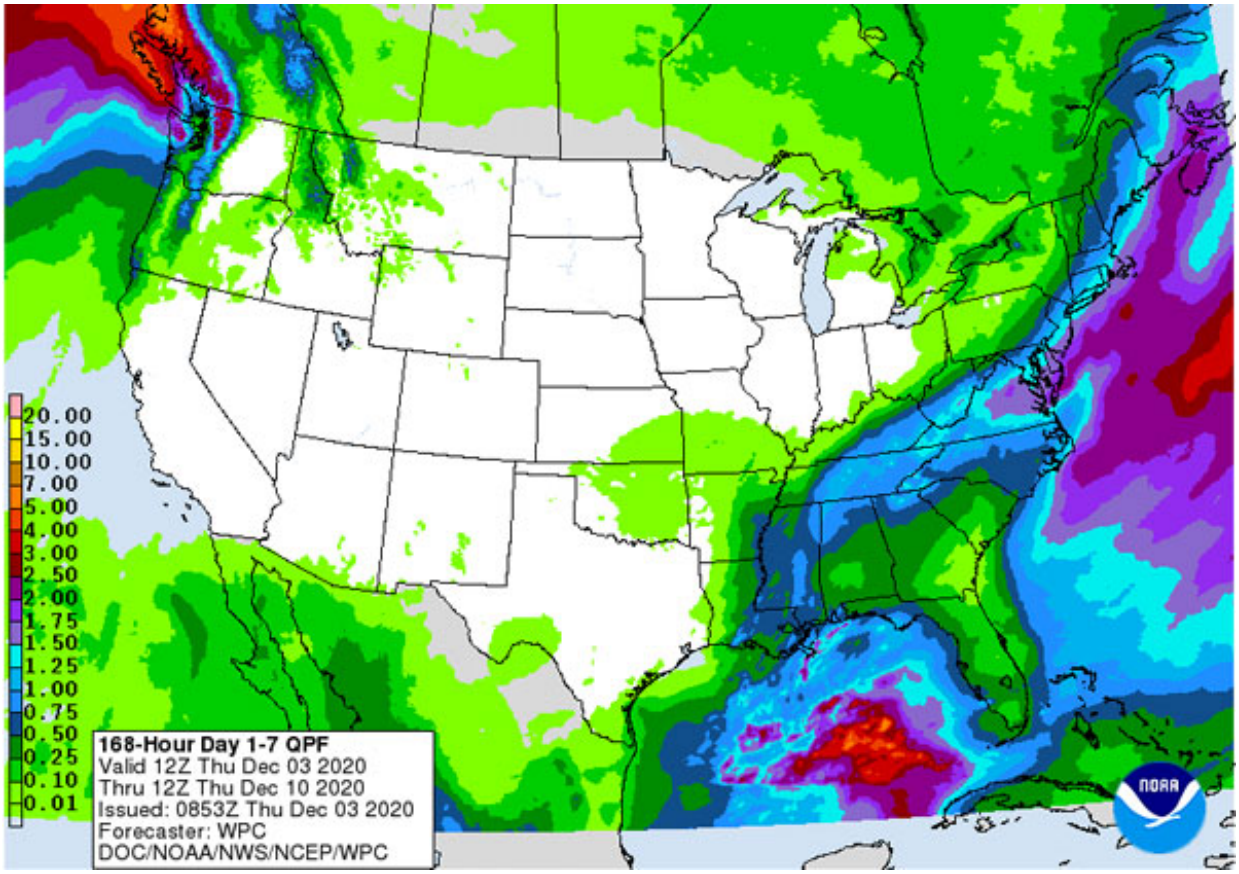

Figure 7. Quantitative precipitation forecast for week ending on 12/10/2020 (Weather Prediction Center).

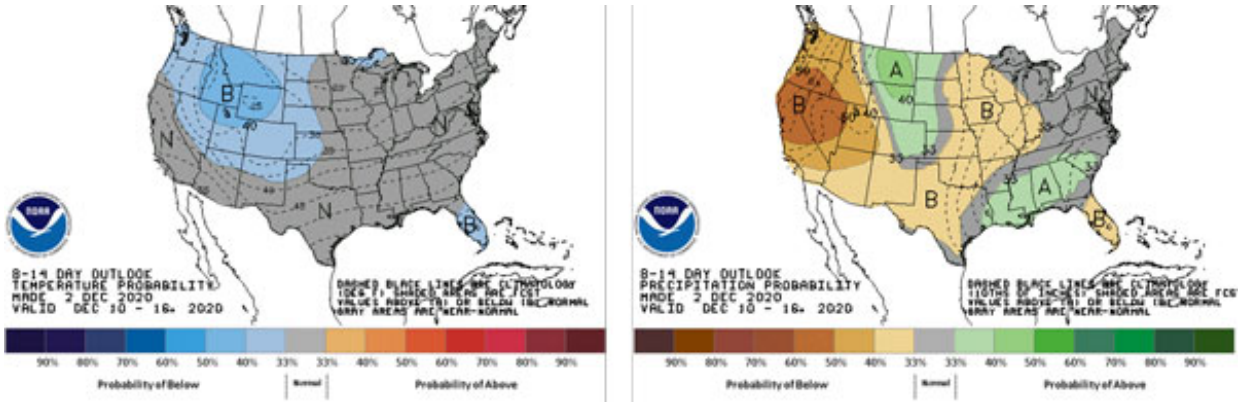

Figure 8. 8 to14 day temperature and precipitation probability outlooks for 12/10 – 12/16 (Climate Prediction Center).

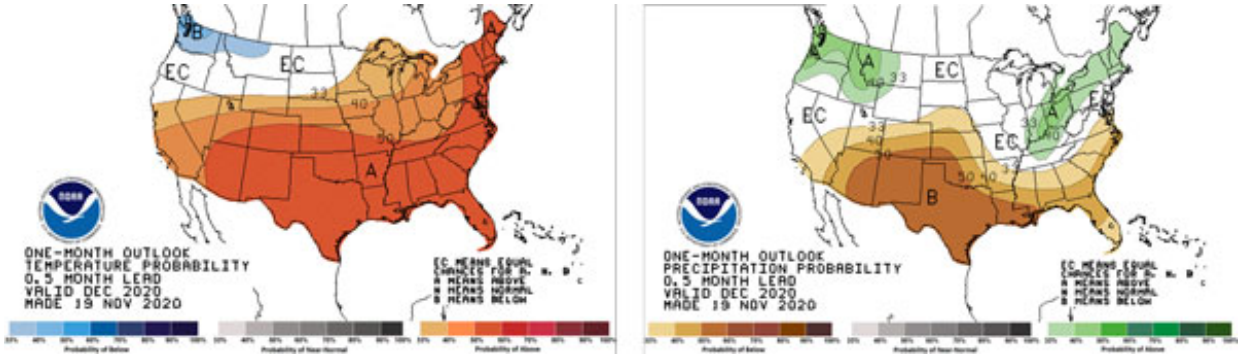

Figure 9. Temperature and precipitation outlooks for December 2020 (Climate Prediction Center).

More details in upcoming webinar

The Kansas Water Office is hosting an informational webinar on Monday, December 7, 2020. This webinar will provide more details on the current drought situation, as well as an updated outlook for the coming months. You can access the webinar details and register here: https://fb.me/e/1X3ZUafzA

Summary

- Heavy precipitation bisects the state
- Near-normal temperatures statewide.
- Some reduction in drought for areas with heaviest precipitation
- Limited precipitation for the week of Dec. 3 –Dec. 10

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3. 2021 spring wildfire outlook for Kansas

Spring wildfire season in Kansas can be highly variable and depends on residual impacts from the previous growing season and often short duration weather events. While prolonged drought and climate conditions impact the availability of fuels, wind events and dry periods several months out are impossible to predict. However, using specific global circulations, trends, and previous weather, we can approximate the expected fire conditions next spring.

2020 Spring fire weather summary

Winter precipitation was above normal most of Kansas last year. Combined with warmer than normal temperatures, this led to an earlier than normal spring green up across the region. Fortunately, this saved Kansas from seeing an above normal fire season as the months following green up were quite dry (Figure 1). As a result, a relatively quiet fire season occurred. Fire reports increased early summer as a result of such a dry late spring but quickly receded in July with above normal precipitation for all but the far west.

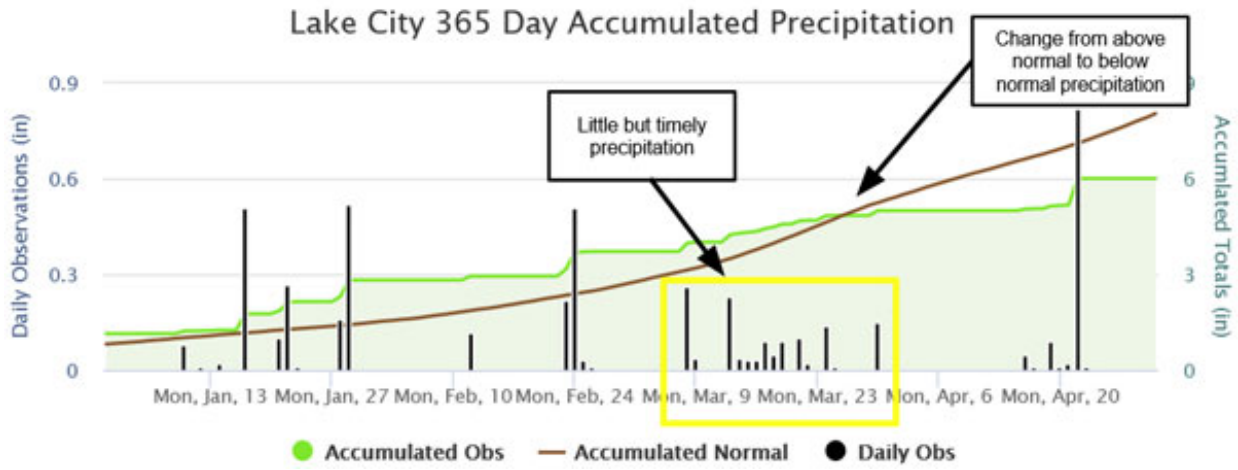

Figure 1. Timely precipitation to avoid heightened fire weather while trending below normal at Lake City (mesonet.ksu.edu/precip/daily**).**

Fuel loading - Precipitation varied greatly across the state over the past growing season. A few areas have seen below average fuel growth compared to normal, including the southeast and portions of central and far southwest Kansas, in part due to poorly timed drought. Other areas, especially the northwest into the north-central and the south-central part of the state, received timely rains and have observed above normal fuel growth. These areas will be of increased concern going into the 2021 fire season.

Current drought - Drought became very prevalent across Kansas during the late fall with an extended period of warm/dry/windy conditions (Figure 2-left panel). As a result, we have seen another unusually busy fall/early winter fire season with several large fires. Thankfully, recent precipitation especially in the central/east portions of the state have seen rebounds in fuel moisture, greatly reduced fire behavior, and decrease of drought conditions (Figure 2-right panel). Further

west, the greatest concern resides in the northwest where some areas haven't seen wetting moisture (greater than or equal to 0.1 inch) in several months.

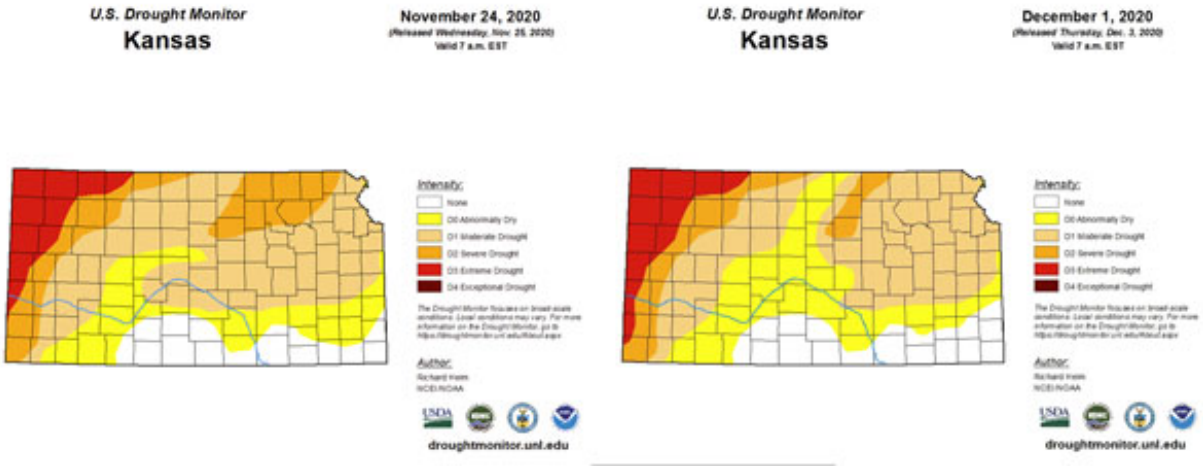

Figure 2. Drought monitor last week (November 24, 2020 - left) and this week (December 1, 2020 - right) via the Drought Monitor (droughtmonitor.unl.edu**).**

Climate trends - A moderate La Niña event is underway in the east Pacific. Colder than normal water at and below the surface suggests it will remain through most of the winter. This typically spells warmer (averaged between swings of warm/cold periods) and drier conditions for the state of Kansas into spring. However, as we have already seen with the recent storms, periods of moisture are definitely still possible for the east, but will be much harder to come by for western Kansas. In addition, the next few months are typically the driest months of the year - therefore, any moderate precipitation event can easily skew statistics from a "dry" winter to a "wet" winter.

Another concern for Kansas relies on the mountains to our west. Much of the west resides in an exceptional, and growing, drought. While precipitation across the Southwest and Rocky Mountains have been increasing in recent weeks - these long term deficits will play a role in incoming Pacific moisture, as well as system dynamics, to bring Gulf moisture northward. Current models depict a dry March across the southwest US (Figure 3). La Niña's aren't very beneficial to the southwest and if the dry predictions verify, expect an increase in dry systems to impact Kansas in early spring - usually an indicator of an active fire season.

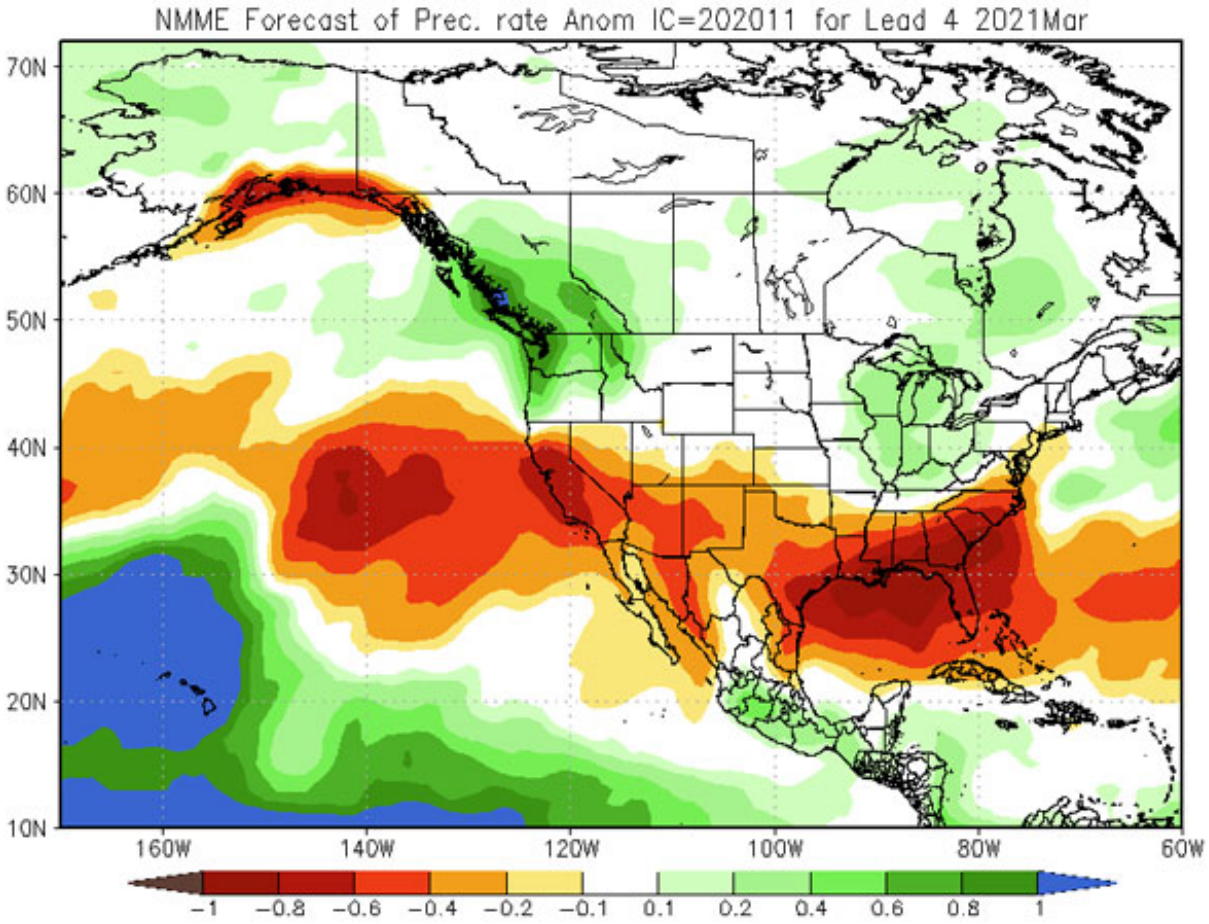

Figure 3. Precipitation rate anomalies using the NMME via NOAA (https://www.cpc.ncep.noaa.gov/products/NMME/monanom.shtml).

Spring 2021 forecast

This spring, we expect an average, to slightly above average Kansas fire season. This would entail an increased number of large fires than in the last two springs.

The Kansas recipe for large fires typically includes a dynamic storm system with wind shifts and associated dry fronts. While antecedent dry conditions can aid in extreme fire behavior, most large fires have fallen into a "gray" area that aren't specifically in extreme drought but see enough drying to exhibit spotting concerns and suppression difficulty. Light flashy fuels (one hour fuels) are the primary carrier with poor humidity recovery and larger burn windows required for large fires.

With all indications of warmer than normal conditions over the next few months, increased evaporation and breezy dry frontal passages are preferred and will be exacerbated in dry conditions. This will be especially a concern for the northwest if they continue to miss out in precipitation leading into March. With above normal fuels, focus will also be on the southern portion of the state (Figure 4). While we will definitely receive some needed rain/snow as we have observed over the past few weeks, the positive impacts are rapidly diminished with these warm/dry periods which will be common this winter.

Normally, the fire season runs from late February to as late as mid-April. With warmer than normal temperatures, early green up will be likely should there be suitable moisture. There are some indications that the season will be shorter than normal for portions of east and south-central Kansas as moisture becomes more widespread with a possibly active spring storm season.

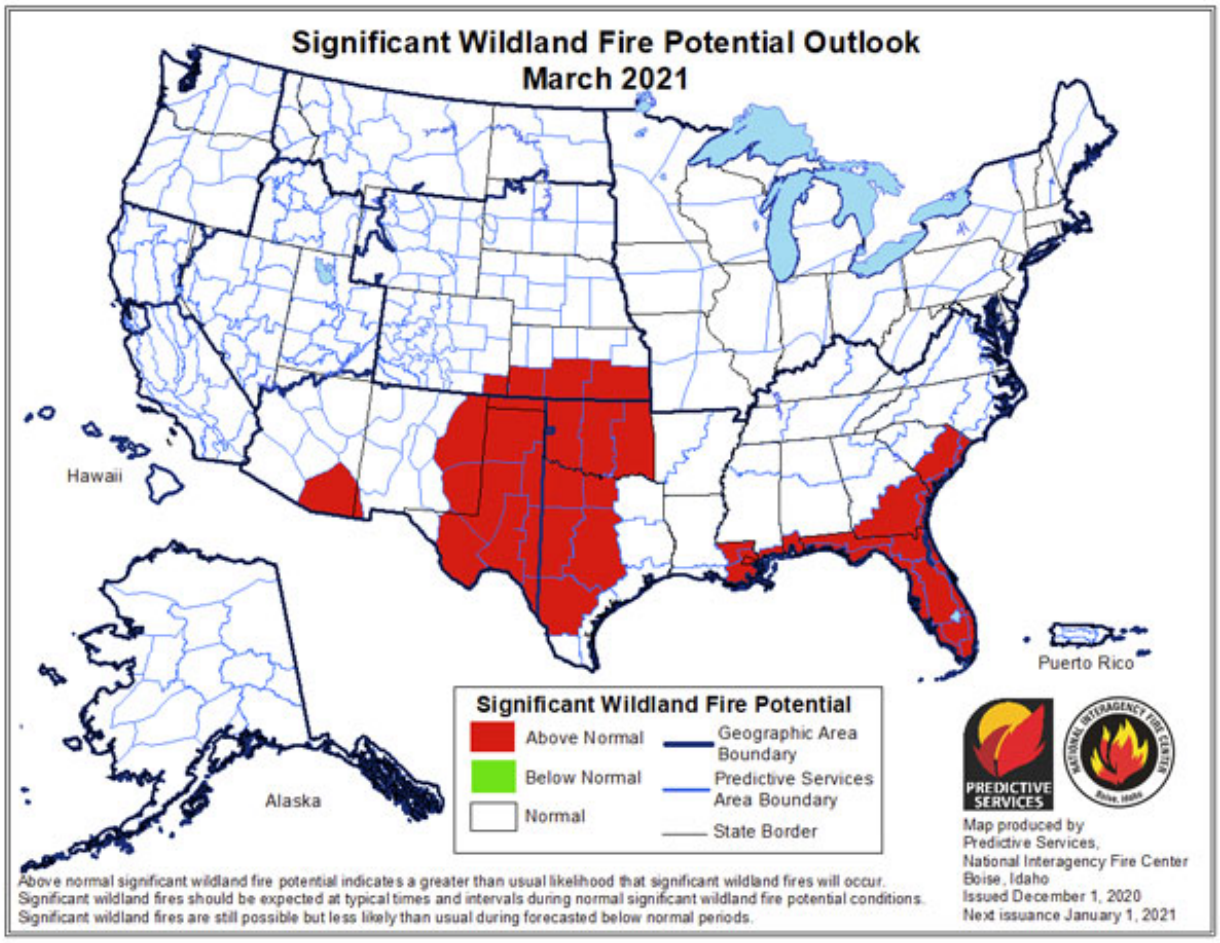

Figure 4. Significant wildland fire potential outlook from National Interagency Fire Center Predictive Services (https://www.predictiveservices.nifc.gov/outlooks**).**

Highlights

- Timely green up, and warmer than normal temperatures aided in a below average 2020 spring fire season.
- Grass fuel loading varies by location but remains generally above normal in areas of north-central and south-central Kansas.
- Prominent La Niña conditions are expected to result in warmer than normal temperatures and drier than normal predictions this winter.
- Kansas fire season (Feb - Apr) is expected to be average to slightly above average with an increased number of large fires than the last two spring seasons.

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4. 2020 Virtual Crop Pest Management Schools - Dec. 8 and 10

K-State Research and Extension, NW Region counties/districts are hosting two **"Virtual" Crop Pest Management Schools, December 8 and December 10** starting at 7:50 AM with "online check-in" and ending at 5:00 PM.

Join us ONLINE to learn about how to control the latest pests – weeds, insects, and diseases – affecting all crops in central and western Kansas! These schools are entirely online. In order to participate, you must have a computer (desktop or laptop) or tablet with an internet connection. The same program will be presented on both days, allowing flexibility in choosing a date for interested individuals.

Commercial Applicators can earn 1 Core Hour & 7 Hours for 1A, certified by Kansas Department of Agriculture. Certified Crop Advisors (CCA) can also earn 8 Pest Management Credits. These schools would also be an excellent educational opportunity for producers!

The cost to participate is $40. Those wishing to participate are asked to **register by Sunday, December 6, by midnight**. Simply go to: http://www.northwest.k-state.edu/events/crop-pest-mangagement-school or to any Extension Office website in the NW region or call:

Craig Dinkel, Midway Extension, 785-483-3157

Cody Miller, Phillips/Rooks Extension, 785-543-6845

Clint Bain, Golden Prairie Extension, 785-743-6361

Sandra Wick, Post Rock District, 785-282-6823

VIRTUAL CROP PEST MANAGEMENT SCHOOL

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Credits Available:

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1 Core Hour & 7 for 1A

Certified Crop Advisors:
8 Pest Management Credits

For questions please contact:

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Jeanne Falk Jones, K-State Multi-County Agronomist
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7:50 Zoom Open	
8:05 Welcome and Housekeeping	
8:15 Technology Update in Insect Control	Dr. J.P. Michaud
9:10 Those Challenging Weeds - Palmer Amaranth	Dr. Vipan Kumar
10:05 Break	
10:20 Alfalfa Management - Insects & Diseases	Dr. Romulo Lollato
11:15 Technology Update in Weed Control	Dr. Sarah Lancaster
12:10 Lunch	
12:50 Wheat Diseases	Dr. Kelsey Anderson Onofre
1:45 Application Technology	Dr. A.J. Sharda
2:40 Break	
2:55 Diseases of Row Crops (Corn, Soybeans & Grain Sorghum)	Dr. Rodrigo Borba Onofre
3:50 Kansas Regulations (Core Hour)	KDA Representative
4:45 Questions	
5:00 Adjourn	

Kansas State University is committed to making its services, activities and programs accessible to all participants. If you have special requirements due to a physical, vision, or hearing disability, or a dietary restriction please let us know when placing your RSVP. K-State Research and Extension is an equal opportunity provider and employer.

K·STATE Research and Extension

5. Update - Winter Forage Conference is going virtual

The annual Winter Forage Conference hosted by the Kansas Forage and Grassland Council and Kansas State University has been switched to a totally virtual event and will not take place in Great Bend.

The event will still occur on Thursday, December 10, 2020, beginning at 9:00 am CST. The program will continue to feature agricultural specialists addressing several forage topics including, pasture management and weed control, current hay prices and statistics, along with alfalfa management, insect control and a research update.

Featured speakers include:

- Kim Nettleton, Kansas Department of Agriculture, market news
- Don Miller, Alforex Seeds
- Romulo Lollato, wheat and forages extension specialist
- Keith Harmoney, range scientist
- Walk Fick, KSU range management specialist

The event is free for current KSFGC members whose memberships extend into 2021, and registration is $25 for non-members, payable online. To learn more, go to https://ksfgc.org/upcoming-events/.

You must register online to receive the ZOOM link, http://bit.ly/KSFGCam

Please direct questions to Mark Nelson at info@ksfgc.org, or by calling (785-587-6103) or Alicia Boor by e-mail at aboor@ksu.edu or by calling 620-793-1910.

KSFGC
Kansas Forage and Grassland Council

The Kansas Forage and Grassland Council was organized in 1988 to strengthen the forage base for the livestock industry through more efficient production and utilization. KSFGC serves to provide education and programs to strengthen the forage industry in Kansas.