



## Extension Agronomy

# eUpdate

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*11/30/2018*

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](mailto:kgehl@ksu.edu), or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 [dpeterso@ksu.edu](mailto:dpeterso@ksu.edu).

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## 1. Challenges with late-harvested crops and forages - Part 2

This eUpdate article details specific options for late-harvested forages in Kansas and is a follow-up to an article published on November 16 in Issue 721. Readers can find the first article at the following link: <https://ksu.ag/2DlvkQ1>.

### **Baling rained-on forages**

To say baling forages this year has been a challenge would be an understatement. Many producers had good forage yields but struggled to get the crop dry enough for baling. Rain, and eventually snow, fell in many places across Kansas, which delayed the dry down time until baling. Some producers still have their crop in the field. Large tonnage windrows and large crop stalks, like forage sorghum, require one to two weeks of drying before baling with good weather drying conditions. This year, some producers received over 12 inches of rain after swathing. This resulted in crop regrowth upwards of six feet tall, making it difficult to see the windrow and reducing the air movement near the ground needed to dry out the crop for baling.

Raking can often speed up the drying process, however with large windrows, merging two windrows together can slow drying and make a windrow so large that a baler has a difficult time handling all the material. With large windrows, inverting or fluffing the crop can help speed the drying process, particularly the lower portion of the windrow. Before inverting, the stalks in the middle and top third of the windrow need to be dry. In addition, the ground next to the windrow must be dry before moving hay onto it. Frequent rains have made this difficult. Also, inverting the windrow exposes more of the crop to potential rainfall, thus fluffing the crop is sometimes a better option.

There is both a science and an art to baling hay. Moisture content of large bales should be < 16%. If moisture content is too high, the temperature within the bale will increase, and in extreme cases can exceed 195 degrees F and spontaneously catch fire. If the bale heats to temperatures > 120 degrees F, protein can be damaged and becomes unavailable, total digestible nutrients (TDN) is reduced, and dry matter loss occurs. The art to baling comes from knowing if the moisture in the windrow is within the stalk or due to relative humidity, and matching relative humidity to moisture content of the windrow to minimize leaf loss. It is imperative that there is no stalk moisture when baling. If the moisture is coming from relative humidity, one can push the upper limits of the previously recommended moisture content without causing problems as long as the crop is thoroughly dry. Most operators learn these limits after years of baling, yet occasionally push them a little too far when rain is in the immediate forecast!

Propionic acids are occasionally used as a preservative to reduce heat damage from baling too wet. However, propionic acids do not work well with round bales due to larger bale size and poor distribution of the preservative in the baling process. More importantly, the added expense of the preservative is only cost effective with higher value crops like alfalfa and not forage sorghum.

Cutting the crop high and leaving 6 inches of stubble can help hold the crop off the ground to aid in the drying process. However, with excessive rainfall, the crop will eventually settle to the ground, as was often the case this year. Maintaining crop stubble also helps prevent soil erosion and capture moisture. The lower portion of the windrow with excessive rain can be wet and moldy, while the upper portion dry. Some producers may be able to set a rake or baler pickup attachment a little higher than normal and leave the lower portion of the windrow on the field. This reduces the

moisture content of the bale that otherwise might have been too wet and resulted in heat damage and further loss. This lower portion can be sacrificed if additional rain is in the forecast. If the lower portion has become moldy, cattle would have rejected if fed free choice. Or, one can hope that there will still be enough dry, warm days this fall to wrap up baling later.





**Figure 1. Regrowth in forage sorghum (top photo) and large windrow of forage sorghum (lower photo, bottom left corner). Photos by John Holman, K-State Research and Extension.**





**Figure 2. Bales in the background showing no sign of squatting, indicating moisture content was appropriately dry at harvest. Photo by John Holman, K-State Research and Extension.**



**Figure 3. Photo illustrates a portion of the crop left on the ground after baling to reduce moisture content and moldy feed in the bale. Arrows indicate the old bottom portion of the windrow left on the soil surface. The other residue is regrowth that occurred after swathing.**



### **Silage Option**

In some instances, swathing was delayed waiting for drier weather that would be more conducive to baling. However, by delaying swathing the crop becomes more mature resulting in lower CP, lower energy, and reduced palatability. This year because the rain events kept occurring, the crop matured to the point that harvesting the crop as silage rather than baled forage might be a better option for those that can feed silage. Leave at least 6 inches of residue cover on the field to minimize the potential for soil erosion through the winter. When harvesting for silage, the moisture content should be 60 to 65%. If harvesting silage after a frost, the moisture content might drop below 60 percent. If this is the case, water can be added to the top two to three feet as it is packed in the silo to obtain a good pack. However, it may be logistically difficult to apply enough water fast enough to keep up with the rate of silage being brought in. When applying water, uniformly apply to the entire surface after each load. Adding seven gallons of water per ton of silage will increase the moisture content about one percent. Delaying silage harvest too long will result in leaf loss and lodging, so don't delay long after a frost if harvesting as silage. If the crop is too dry, ensiling won't work and the only options are to swath and bale or graze. Putting silage up too wet can result in seepage and nutrient loss. Cover the silage pile soon after packing to minimize dry matter loss.



**Figure 4. Tall-cut silage stubble for ground cover. Photo by John Holman, K-State Research and Extension.**



## Swath-grazing Forages

Given the conditions this year, one of the best options might be to graze the windrows. Cattle will first selectively graze the regrowth if present, particularly the heads and leaves, before grazing the swathed forage. If the windrow was tight and narrow and yields were high, the crop under the top might be surprisingly well preserved. Grazing the windrows directly may require some portable fence and water hauling, but will save the cost of baling and feeding. Strip grazing the windrows will reduce the amount of waste but will also increase labor costs. If grazing, sample the forage and provide supplementation as needed. Any class of animal could initially be used to graze the windrows (although additional CP or TDN might be required), however, dry mature cows are likely to do the best job cleaning up the last of the windrows. Two toxicities to be aware of are nitrates and prussic acid. In some cases, the forage should be tested before feeding. This past year, with all the rain, it is unlikely nitrates will be a problem unless the crop was heavily fertilized. Sorghum contains cyanogenic glucosides, which are converted quickly to prussic acid in freeze-damaged plant tissue and also occur in young new growth. Prussic acid restricts the ability for blood to carry oxygen, causing animals to die of asphyxiation within minutes of ingestion under the right circumstances. Frost causes plant cells to rupture and prussic acid gas forms in the process. Because the prussic acid is in a gaseous state, it will gradually dissipate as the frosted/frozen tissues dry. Thus, risks are highest when grazing frosted sorghums and sudangrasses that are still green. New growth of sorghum species following frost can be dangerously high in prussic acid due to its young stage of growth. Prussic acid content decreases dramatically during the hay drying process and during ensiling. Frosted foliage contains very little prussic acid after it is completely dry, therefore it is recommended to wait ten days until after a killing freeze before grazing. Sorghum and sudangrass forage that has undergone silage fermentation is generally safe to feed.

If the forage is baled and ground and part of a total mixed ration, then the forage will be consumed if the weathered forage content is not too high. If the hay is fed free choice, cattle rejection and trampling will approach 20 to 30% (perhaps more if extremely moldy), about the same as if just letting cattle graze the windrows. In addition, there are soil nutrient and carbon benefits to leaving residual swath grazed residue on the field.



**Figure 5. Forage regrowth and windrows partially grazed by cattle. Photo by John Holman, K-State Research and Extension.**



**Figure 6. Cattle-grazed windrows - Forage is still green inside the windrow despite being swathed 60 days ago. The forage received 14 inches of precipitation after swathing. Photo by John Holman, K-State Research and Extension.**





**Figure 7. Cattle grazing windrows and forage sorghum regrowth. Photos by John Holman, K-State Research and Extension.**

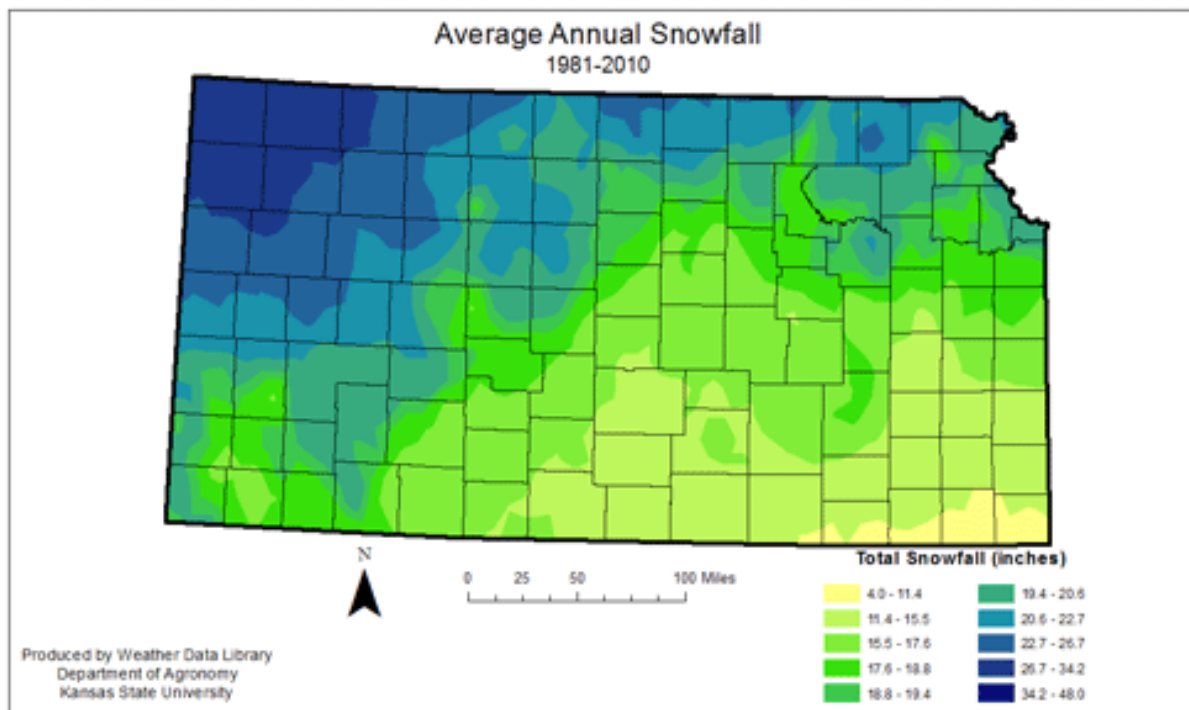
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## 2. Facts about Kansas snow cover

### Annual totals versus days with snow

Snowfall is most frequently reported as monthly, annual, or seasonal amounts. These are usually the totals for the given period, or the current normal. As might be expected, actual values can vary quite a bit from one part of the state to the next and from year to year. The most recent normal period (1981-2010) shows a strong gradient with the highest annual snowfall in the northwest and lesser amounts in the southeast (Figure 1).

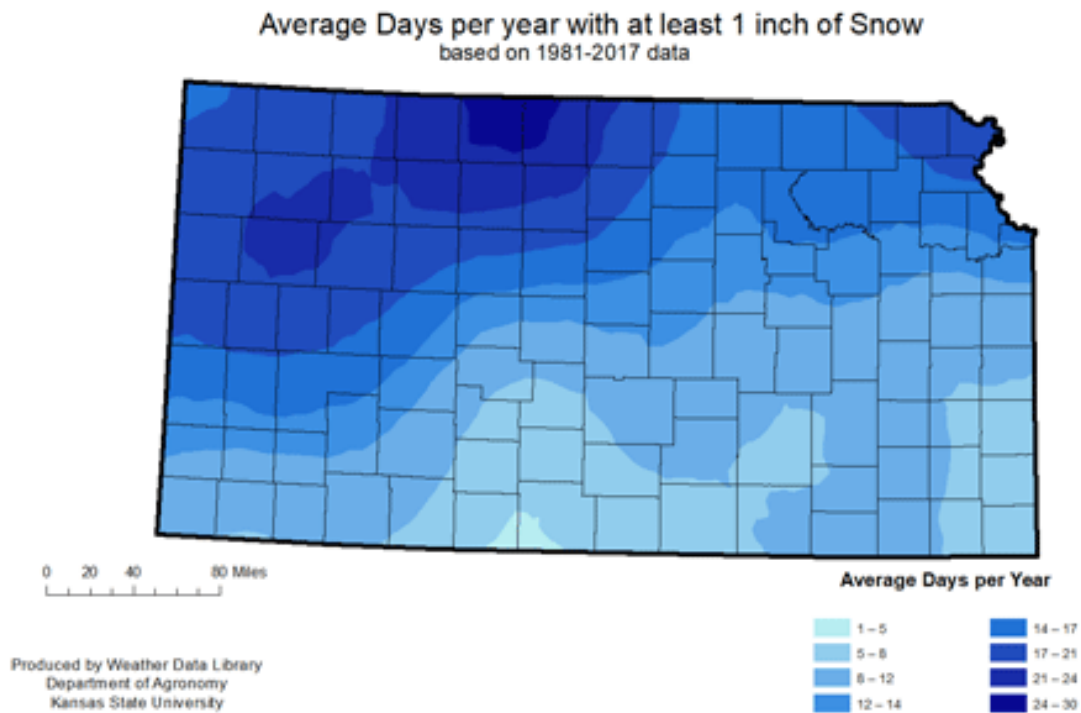


**Figure 1. Normal annual snowfall (WDL)**

### Snow on the ground

The annual or even monthly snowfall totals do not tell the whole story. The question you might ask is “how frequently do the snow events occur and also, how long does the snow persist?” Not surprisingly, that will vary from year to year and from location to location. Using 1981-2010 data and a 1-inch total as the threshold, in the northwest that average is as high as 40 days per year. In the south central and southeast, the averages are generally less than 10 days per year (Figure 2).

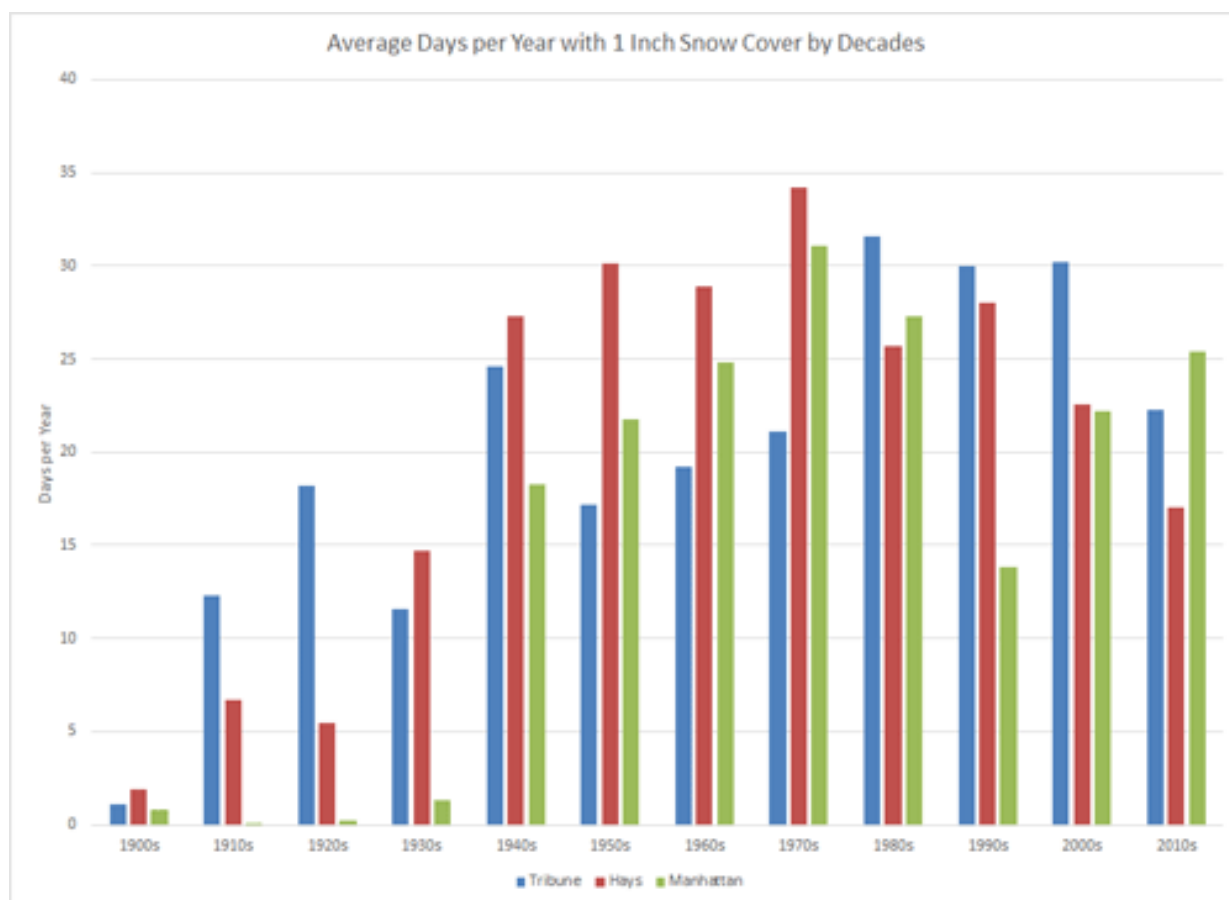




**Figure 2. Average days with 1 inch or more of snow (WDL)**

### **Changing pattern?**

Another question that frequently comes to mind is whether the snow events are more or less frequent than earlier in our observed records. Here we compared three stations for changes in the snow events from 1900s to 2010s. Spatial differences across the state are shown in Figure 3, with the greatest frequency of snow covered days in Manhattan and Hays occurring in the 1970s. For Tribune, the highest average occurred in the 1980s. Manhattan, located in the eastern Kansas, showed an increased trend but decreased trends are depicted in both Hays and Tribune in western Kansas.



**Figure 3. Days with snow cover in Tribune, Hays, and Manhattan by decade (Weather Data Library).**

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### 3. A Brief of the Fourth National Climate Assessment for the Southern Great Plains

The United States Global Change Research Program (USGCPR), established by Presidential Initiative in 1989 and mandated by Congress in the Global Change Research Act of 1990, just released the Fourth National Climate Assessment (NCA4), which includes two volumes:

- The Climate Science Special Report (CSSR, NCA4 Vol. I)
- Impact, Risks, and Adaptation in the United States (NCA4 Vol. II).

To date, three previous NCA reports have been released. The first was published in 2000 and the second in 2009. The third NCA, "Climate Change Impacts in the United States", was published in 2014. NCA4 builds on the work of these previous assessments. Both volume I and II of NCA4 are technical scientific assessments written by an extensive team of scientists from Federal agencies, academia, and the private sector. These authors were nominated through a public process and selected for their expertise in their respective fields of study.

The CSSR is a scientific analysis that primarily integrates, evaluates, and interprets the findings of climate and climate changes, and discusses the uncertainties associated with such findings. The NCA4 Vol. II mainly addresses impacts and current trends influenced by both humans and natural forces, as well as projected trends for the next 25 to 100 years.

Climate is changing rapidly and consistently compared to the natural variations in climate that have observed throughout our history. Observational evidence does not support credible natural explanations for a 1.7-degree F warming from 1901 to 2016. Robust scientific evidence consistently points toward the emissions of greenhouse gases by human activities as being the major cause.

Here we briefly recap the summary information of key messages and major findings for the Southern Great Plains (SGP) including Kansas, Oklahoma, and Texas.

#### **Main Scientific Findings for the Southern Great Plains:**

1. Days > 100 degrees F projected to increase by up to 30-60 days per year
2. Annual average temperature increase of 3.6 to 5.1 degrees F by the mid-21st century
3. Historical sea level rise of 5-17 inches along the Gulf coast, with a projected further increase of 1-4 feet by 2100
4. Increases in both extremely heavy rainfall, and drought
5. Increases in damaging storm surges when tropical cyclones occur
6. Future trends in tropical cyclone frequency, tornadoes, and severe local storms are uncertain
7. Decreases in winter weather and extreme cold

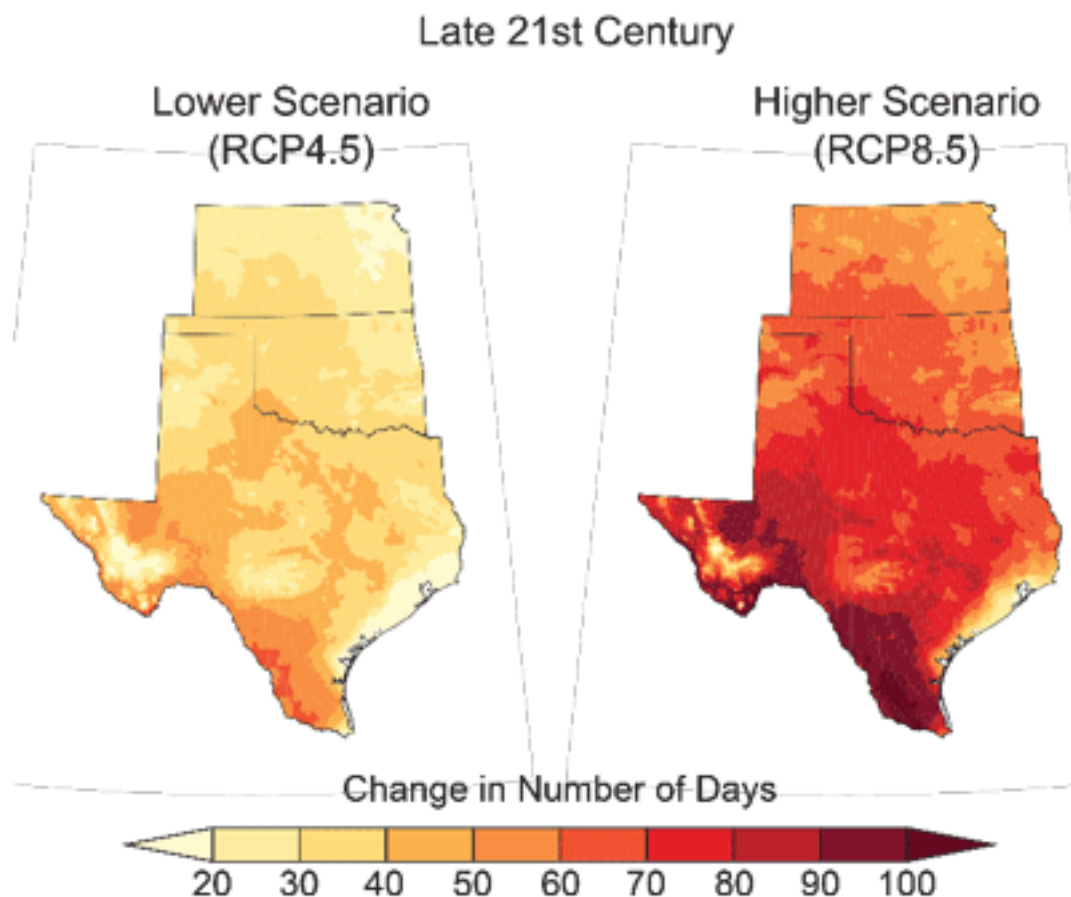
#### **Key Messages for the Southern Great Plains:**

1. Quality of life in the region will be compromised as increasing population, the migration of individuals from rural to urban locations, and a changing climate redistribute demand at the intersection of food consumption, energy production, and water resources. A growing number of adaptation strategies, improved climate services, and early warning decision support systems will more effectively manage the complex regional, national, and international issues associated with food, energy, and water.



2. The built environment (e.g. buildings and other human-made infrastructure) is vulnerable to increasing temperature, extreme precipitation, and continued sea level rise, particularly as these structures age and populations shift to urban centers. Along the Texas Gulf Coast, relative sea level rise of twice the global average will put coastal infrastructure at risk. Regional adaptation efforts that harden or relocate critical infrastructure will reduce the risk of climate change impacts.
3. Terrestrial and aquatic ecosystems are being directly and indirectly altered by a changing climate. Some species can adapt to extreme droughts, unprecedented floods, and wildfires from a changing climate, while others cannot, resulting in significant impacts to both services and people living in these ecosystems. Landscape-scale ecological services will increase the resilience of the most vulnerable species.
4. Health threats, including heat illness and diseases transmitted through food, water, and insects, will increase as temperature rises. Weather conditions supporting these health threats are projected to be of longer duration or occur at times of the year when these threats are not normally experienced. Extreme weather events with resultant physical injury and population displacement are also a threat. These threats are likely to increase in frequency and distribution and are likely to create significant economic burdens. Vulnerability and adaptation assessments, comprehensive response plans, seasonal health forecasts, and early warning systems can be useful adaptation strategies.
5. Tribal and indigenous communities are particularly vulnerable to climate change due to water resource constraints, extreme weather events, higher temperatures, and other likely public health issues. Efforts to build community resilience can be hindered by economic, political, and infrastructure limitations, but traditional knowledge and intertribal organizations provide opportunities to adapt to the potential challenges of climate change.

Climate change leads to an increase in average temperatures as well as the frequency, duration, and intensity of extreme heat events and a reduction in extreme cold events. For examples, by late in the 21st century, if no reductions in emissions take place, the region is projected to experience an additional 30–60 days per year above 100degrees F than it does now (Figure 1).



**Figure 1. Projected increase in number of days above 100 degrees F. Note that the RCP 4.5 and 8.5 represents the representative concentration paths for equivalent 1370 ppm and 650 ppm CO<sub>2</sub> concentration in year 2100, respectively.**

For the complete report, readers can access the following links for the two volumes of the Fourth National Climate Assessment : Volume I: <https://science2017.globalchange.gov/> and Volume II: <https://nca2018.globalchange.gov>.

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#### 4. Save the Date: K-State Soybean Schools scheduled for late January



A series of nine K-State Soybean Production Schools will be offered in late January to provide in-depth training targeted for soybean producers and key-stakeholders. The schools will be sponsored by the Kansas Soybean Commission.

The schools will cover a number of issues facing soybean growers including: irrigation, weed control, crop production practices, nutrient management and soil fertility, insects, and disease management. More information on specific speakers and topics will be provided in future eUpdate issues as agendas are finalized.

The dates are set and specific locations have been chosen with Schools located across the state.

##### **Wichita, KS**

January 15 (Tuesday) from 8:30 am to 1:00 pm (Jackie Fees, [jfees@ksu.edu](mailto:jfees@ksu.edu))

##### **Parsons, KS**

January 15 (Tuesday) from 3:00 to 7:00 pm (James Coover, [jcoover@ksu.edu](mailto:jcoover@ksu.edu))

##### **Paola, KS**

January 16 (Wednesday) from 8:30 am to 1:00 pm (Katelyn Barthol, [kbarth25@ksu.edu](mailto:kbarth25@ksu.edu))

##### **Holton, KS**

January 16 (Wednesday) from 3:00 to 7:00 pm (David Hallauer, [dhallaue@ksu.edu](mailto:dhallaue@ksu.edu))

##### **Hugoton, KS**

January 24 (Thursday) from 8:30 am to 12:30 pm (Ronald Honig, [rhonig@ksu.edu](mailto:rhonig@ksu.edu))

##### **Scott City, KS**

January 24 (Thursday) from 3:00 to 7:00 pm (John Beckman, [jbeckman@ksu.edu](mailto:jbeckman@ksu.edu))



**Hoxie, KS**

January 25 (Friday) from 8:30 am to 12:30 pm (Keith VanSike, [kvan@ksu.edu](mailto:kvan@ksu.edu))

**Great Bend, KS**

January 25 (Friday) from 3:00 to 7:00 pm (Alicia Boor, [aboor@ksu.edu](mailto:aboor@ksu.edu) / Stacy Campbell, [scampbel@ksu.edu](mailto:scampbel@ksu.edu))

**Beloit, KS**

January 28 (Monday) from 9:00 am to 1:00 pm (Sandra Wick, [swick@ksu.edu](mailto:swick@ksu.edu))

Lunch will be provided courtesy of the Kansas Soybean Commission. There is no cost to attend, but participants are asked **to pre-register by Wednesday, January 9**. Online registration is available at K-State Soybean Schools (<http://bit.ly/KSUSoybean>) or by emailing/calling the nearest local K-State Research and Extension office for the location participants plan to attend.

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## 5. Winter Forage Conference highlights pasture, rangeland, and forage insurance - Dec. 11

Kansas State University and the Kansas Forage and Grassland Council (KSFGC) will hold its Winter Forage Conference and KSFGC Annual Meeting on Tuesday, December 11, 2018, at the Anderson Building on the Lyon County Fairgrounds, Emporia, Kansas. Registration begins at 9:00 a.m. and the conference kicks off at 9:30 a.m.

“Making Pasture, Rangeland and Forage Insurance Work for You!” will be a one-hour, sponsored workshop, featuring Dr. Monte Vandever, Kansas State University, Extension Ag Economist and Jason Timmerman with the Silveus Insurance Group. “There’s been some recent policy changes that folks should be aware of, but Pasture, Rangeland and Forage Insurance can be a great risk management tool for grass and forage managers and we’re delighted to have these two knowledgeable speakers at the conference,” said Mark Nelson, KSFGC Executive Secretary-Treasurer.

Other program highlights include a farmer panel discussing Flint Hills Alfalfa Management, along with presentations by Dr. Dale Blasi on feed and forage quality testing and utilizing test results, Alan Tachman on fall burning for sericea control, and Dr. Leah Tsoodle on the Flint Hills Pasture Report.

Conference Registration is \$45 per farm (plus \$15 for each additional farm member), which includes the noon meal, subscriptions to both Progressive Forage Grower and Hay & Forage Magazines, along with membership to KSFGC, the American Forage and Grassland Council, and the National Alfalfa and Forage Alliance. If you’ve already renewed your KSFGC membership, admission is free.

Farmers and ranchers can learn more and register online at <https://ksfgc.org/wkfc/>. You can also RSVP and pay at the door by contacting either: Franklin County Extension at (785) 229-3520 or [dhibdon@ksu.edu](mailto:dhibdon@ksu.edu), or Lyon County Extension at (620) 341-3220 or [brees@ksu.edu](mailto:brees@ksu.edu). To assist with planning and meal counts, please pre-register or RSVP by December 7, 2018, although walk-ins on December 11 will be welcome.

Please direct any question to Mark Nelson at [info@ksfgc.org](mailto:info@ksfgc.org) or 785-587-6103

*The Kansas Forage and Grassland Council serves as an umbrella organization providing education and programs to strengthen the forage industry in Kansas. Member dues support educational meetings, such as this conference, along with other forage initiatives such as the FFA Forage Proficiency Award, the State Fair Market Alfalfa Show and support for the KSU Forage Judging Team.*