



Extension Agronomy

eUpdate

11/20/2015

These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update 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 Steve Watson, 785-532-7105 swatson@ksu.edu, Jim Shroyer, Crop Production Specialist 785-532-0397 jshroyer@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Chloride as a topdressing nutrient for wheat

With wheat topdressing season soon approaching, producers may be wondering if it would pay to add chloride to their topdressing blend this year. Chloride (Cl) is a highly mobile nutrient in soils and topdressing is typically a good time for application, especially in regions of sufficient precipitation or with coarse texture soils that may cause leaching.

One of the main benefits from good Cl nutrition is the improvement in overall disease resistance in wheat. Wheat response to Cl is usually expressed in improved color, suppression of fungal diseases, and increased yield. It is difficult to predict whether Cl would significantly increase wheat yields unless there has been a recent soil test analysis for this nutrient. Chloride fertilization based on soil testing is becoming more common in Kansas.

As with nitrate and sulfate, Cl soil testing is recommended using a 0-24" profile sample. Based on current data, the probability of a response to Cl in dryland wheat production in northeast and central Kansas seems higher than in western Kansas.

The interpretation of the Cl test and corresponding fertilizer recommendations for wheat are given in the table below. Chloride fertilizer is recommended when the soil test is below 6 ppm, or 45 pounds soil chloride in the 24-inch sample depth. Dry or liquid fertilizer sources are all plant available immediately. Potassium chloride (potash) and ammonium chloride are commonly available and widely used fertilizer products, though other products such as calcium, magnesium, and sodium chloride can also be used and are equal in terms of plant availability.

Soil Test Chloride Interpretations for Wheat in Kansas			
	Soil Chloride in a 0-24 inch sample		Chloride Recommended
Category	lbs/acre	ppm	lbs Cl/acre
Low	<30	<4	20
Medium	30-45	4-6	10
High	>45	>6	0

Deficiency symptoms appear as leaf spotting and are referred to as physiological leaf spot.

K-State has done considerable research on Cl applications to wheat since the early 1980's, mostly in the eastern half of the state. Results have varied, but there have been economic yield responses in almost all cases where soil test Cl levels have been less than 30 lbs/acre.

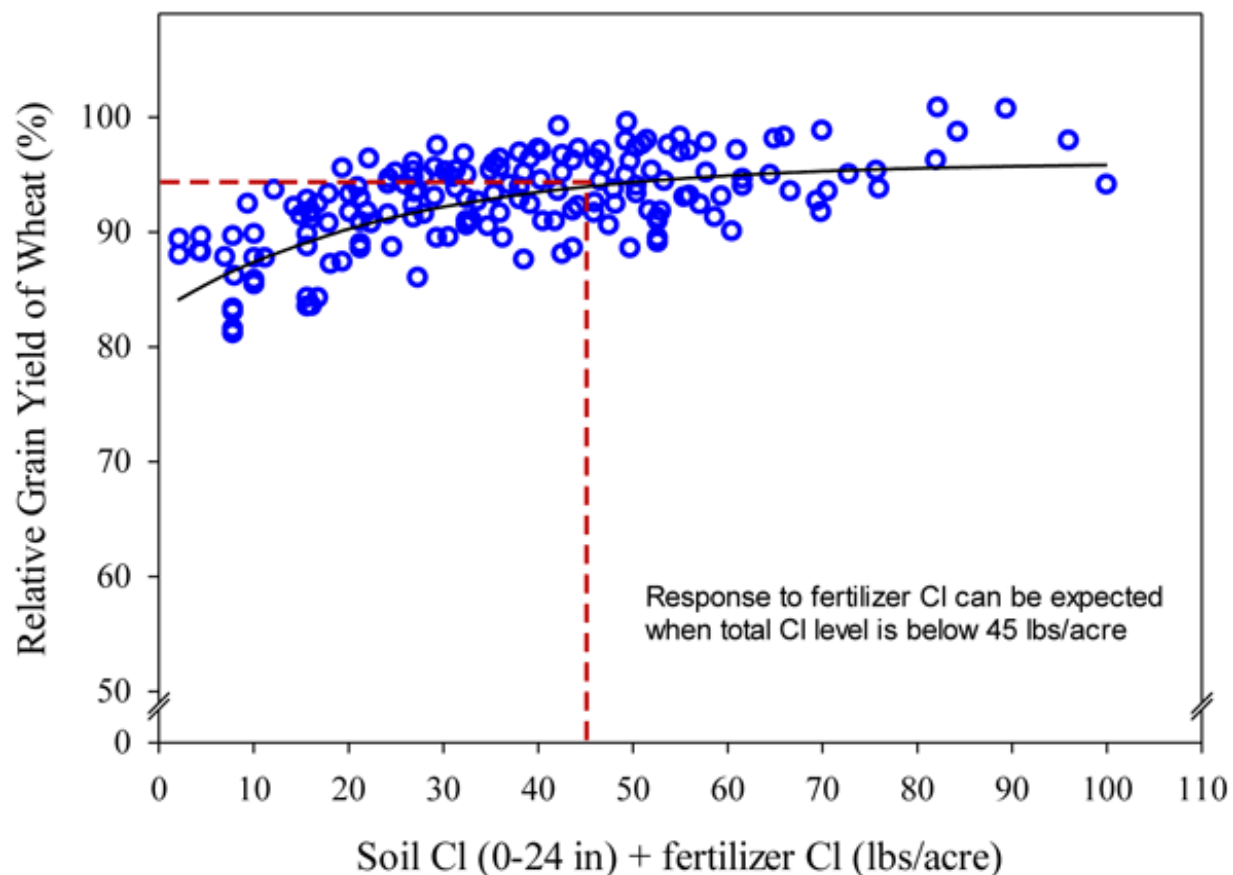


Figure 1. Relative wheat grain yield as affected by total chloride supply (soil + fertilizer) in Kansas.

Deficiencies were most likely to be found on fields with no history of potash (KCl) applications. Early studies showed that there are variety differences in response to Cl, but no recent studies have been done on this.

For more information, see *Chloride in Kansas: Plant, Soil, and Fertilizer Considerations*, MF2570: www.ksre.ksu.edu/bookstore/pubs/MF2570.pdf

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2. Fall growth and development of wheat

This month is a good time to take a close look at your wheat, and see how well it has developed so far. Wheat needs at least 4-5 leaves and 1-2 tillers prior to winter dormancy for maximum cold tolerance. Wheat that has fewer tillers and leaves will be more susceptible to winter kill (Figure 1).



Figure 1. Differences in wheat growth and development as affected by planting date. Wheat planted late October showing no primary tillers, while wheat planted early October has started to tiller. Both crops still need significant fall growth to properly prepare for winter dormancy. Photo taken at the North Agronomy Farm, Manhattan, KS, by Romulo Lollato, K-State Research and Extension.

It is important to look not only at the topgrowth, but at the root system development as well (Figure

2). Roots coming out from the seed are called seminal roots and are used to take up water and nutrients throughout the whole growing season. There aren't very many of these roots so their contribution to overall wheat water and nutrient uptake is limited.

The two protrusions coming out of the white area about an inch above the seed in the photo of early-October planting in Figure 2 are crown roots. These roots take up most of the water and nutrients the plant will need, and they are very important for the plant to survive the winter. If a cow were grazing on this wheat, though, she would probably pull the plant out of the ground as she is eating the leaves as there aren't many roots holding the plant in the soil yet. This wheat crop still needs considerable fall growth prior to grazing or winter dormancy.

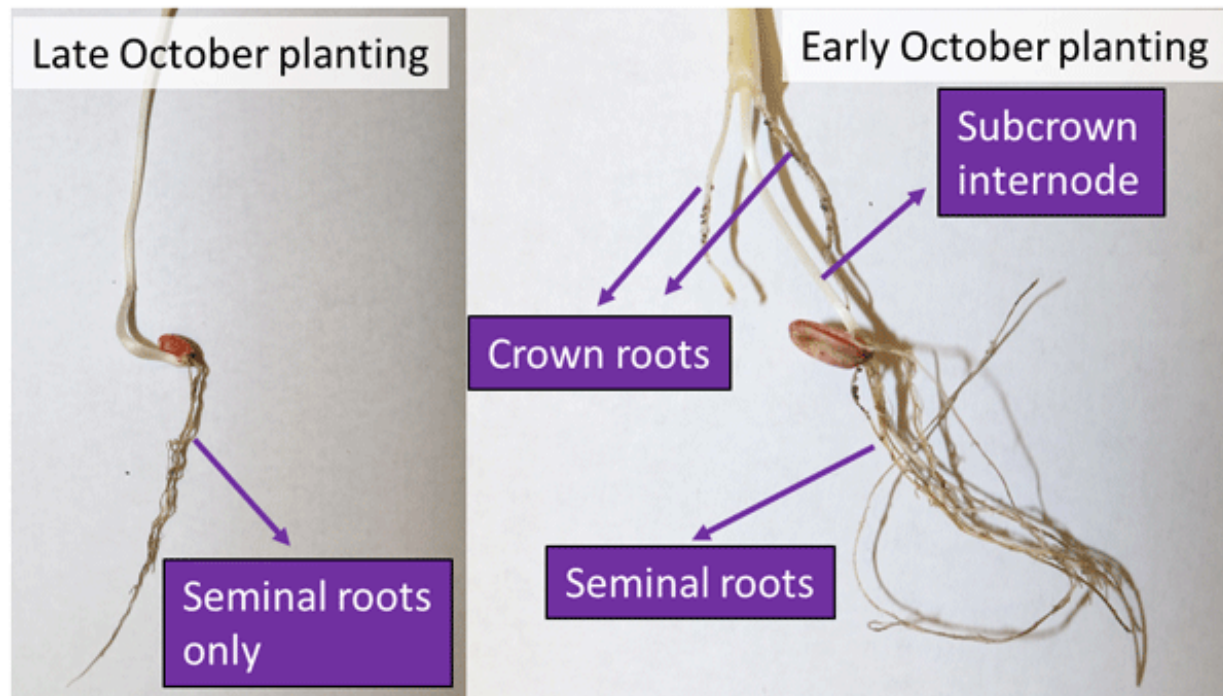


Figure 2. Wheat seminal and crown roots development as affected by planting date. Both rooting systems are not well enough developed to be grazed, and may be susceptible to nutrient deficiencies or desiccation damage over the winter if the crown roots do not get more developed. Photos taken at the North Agronomy Farm, Manhattan, by Romulo Lollato, K-State Research and Extension.

The photos below illustrate various degrees of growth and development, and what you'd like to see when you examine your wheat this fall.

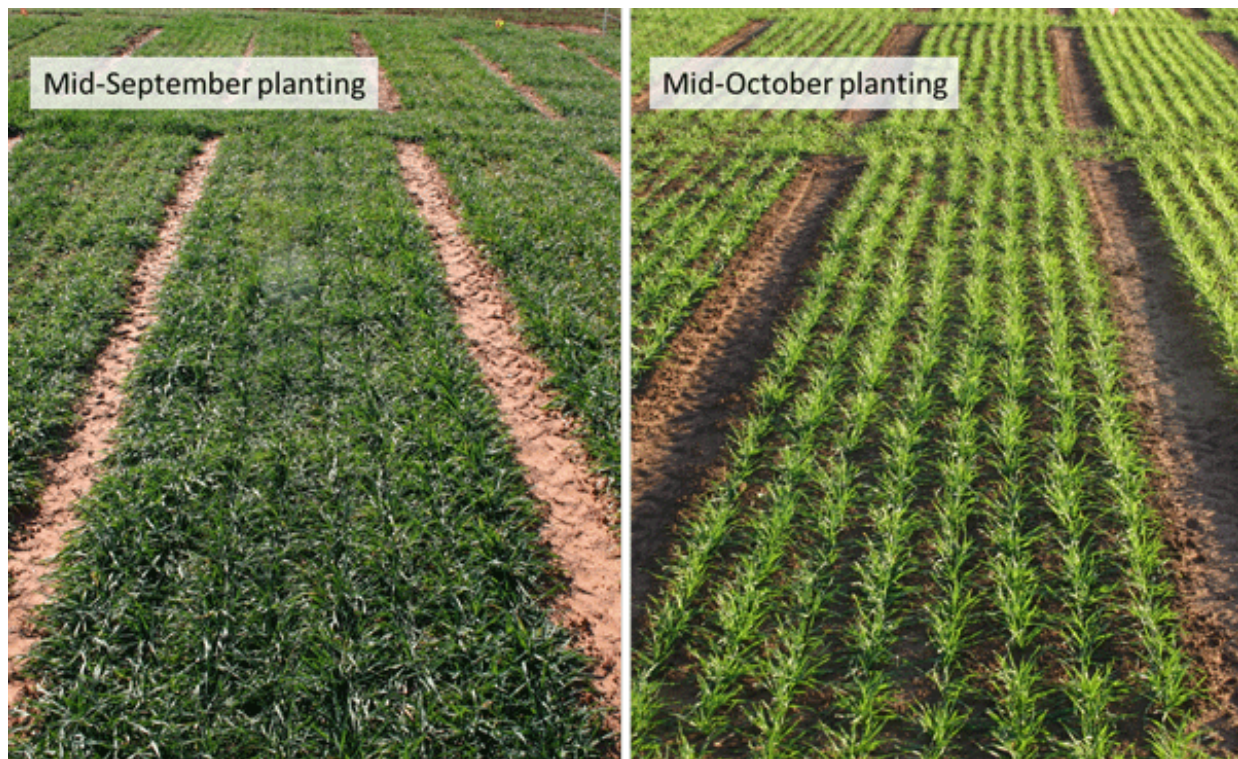


Figure 3. Wheat fall growth and development as affected by planting date. As expected, there is better canopy coverage with early-planted wheat for dual purpose (mid-September planting) as compared to wheat planted at the optimal planting time for grain only (mid-October planting). This does not necessarily mean the early-planted wheat is in better condition for winter, however. As long as the wheat planted in mid-October has 1-2 tillers and good crown root development (as in Figure 4B below), the plants will have adequate growth going into winter. In addition to having adequate topgrowth and root development, factors such as the extent of the plants' cold hardening, variety differences in winterhardiness, soil moisture and temperature, and snow or plant residue protection on the soil surface will ultimately have an impact on winter survival. Photos by Romulo Lollato, K-State Wheat Extension Specialist.

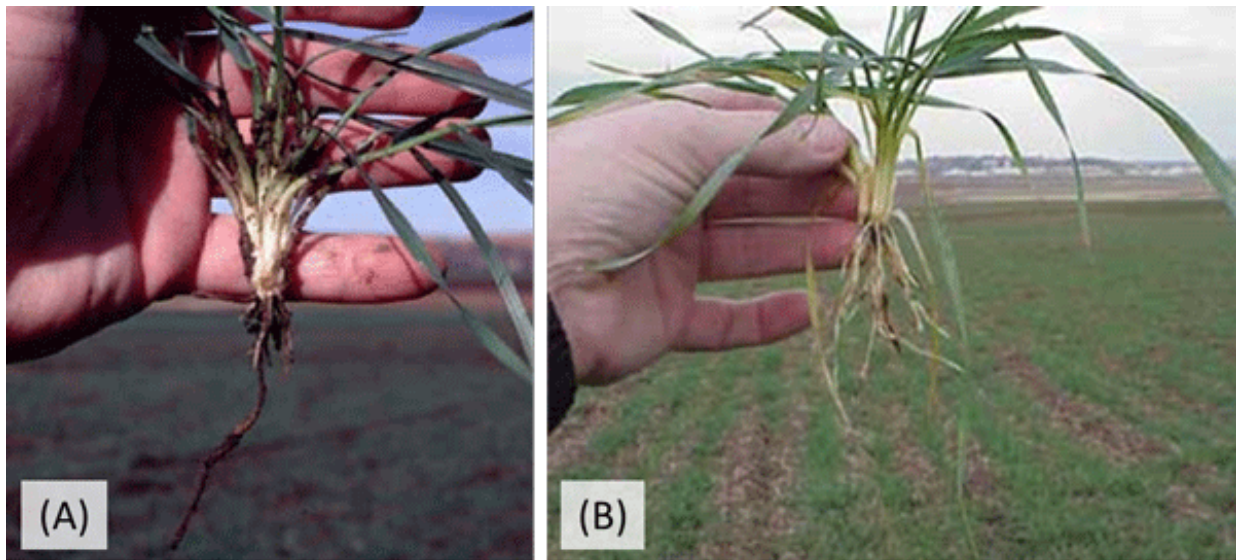


Figure 4. (A) Some of the crown roots are over an inch long. If the weather is mild for a couple more weeks, the roots should grow even more, which would be desirable. (B) Ideal wheat above and below ground development before winter dormancy, with crown roots fully developed and able to provide water and nutrients to the plant. With this amount of crown root development, wheat plants should be well anchored so that if cattle were grazing the wheat they couldn't pull the plants out of the ground. Photos by Jim Shroyer, professor emeritus, K-State Research and Extension.

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3. K-State Corn Production Management Schools scheduled for January



**Primarily
supported by:**



Three K-State Corn Production Management Schools will be offered in early January 2016 in southeast, southwest, and central Kansas. Each school will provide in-depth training targeted for corn producers. Primary sponsors of the schools include the Kansas Corn Commission and DuPont Pioneer.

The one-day schools will cover several current corn topics relevant to corn producers in Kansas: drought-tolerant hybrids, high-yielding corn factors, weed control, soil fertility, and price and market perspectives.

The schools will begin at 9 a.m. and adjourn at 3 p.m., including a tour of facilities or a keynote speaker. The dates and locations are:

Jan. 11: **Independence:** Civic Center. N Penn Ave & W Locust St

Local Research and Extension office contacts:

- Jeri Geren, Montgomery County- Wildcat District, jlsigle@ksu.edu 620-331-2690
- Josh Coltrain, Crawford County- Wildcat District, jcoltrain@ksu.edu 620-724-8233
- Keith Martin, Labette County- Wildcat District, rkmartin@ksu.edu 620-784-5337
- Dale Helwig, Cherokee County, dhelwig@ksu.edu 620-429-3849
- Chris Petty, Bourbon County- Southwind District, cgp@ksu.edu 620-223-3720

Jan. 14: **Garden City:** Clarion Inn, 1911 E Kansas Ave

Local Research and Extension office contacts:

- Katelyn Barthol, Finney County, kbarth25@ksu.edu, 620-272-3670
- Andrea Burns, Ford County, aburns@ksu.edu, 620-227-4542
- Kurt Werth, Grey County, kwerth@ksu.edu, 620-855-3821
- Lacey Noterman, Haskell County, lnote@ksu.edu, 620-675-2261
- Bill Haney, Kearny County, haney@ksu.edu, 620-355-6551
- John Beckman, Scott County, jbeckman@ksu.edu, 620-872-2930

Jan. 15: **Salina:** Great Plains, 1525 E North St

Local Research and Extension office contacts:

- Tom Maxwell, Central Kansas District, tmaxwell@ksu.edu 785-309-5850
- Jonie James, McPherson County, jjames@ksu.edu 620-241-1523
- James Coover, Dickinson County, jcoover@ksu.edu 785-263-2001
- Michelle Buchanan, Midway District, mbuchanan@ksu.edu 785-472-4442
- Kim Larson, River Valley District, kclarson@ksu.edu 785-243-8185

Lunch will be provided courtesy of the sponsors. There is no cost to attend, but participants are asked to pre-register before Jan. 8.

Online registration is available at K-State Corn Schools: <http://bit.ly/KSCORNSchools>

You can also preregister by emailing or calling the nearest local Research and Extension office for the location you plan to attend.

For more information, contact:

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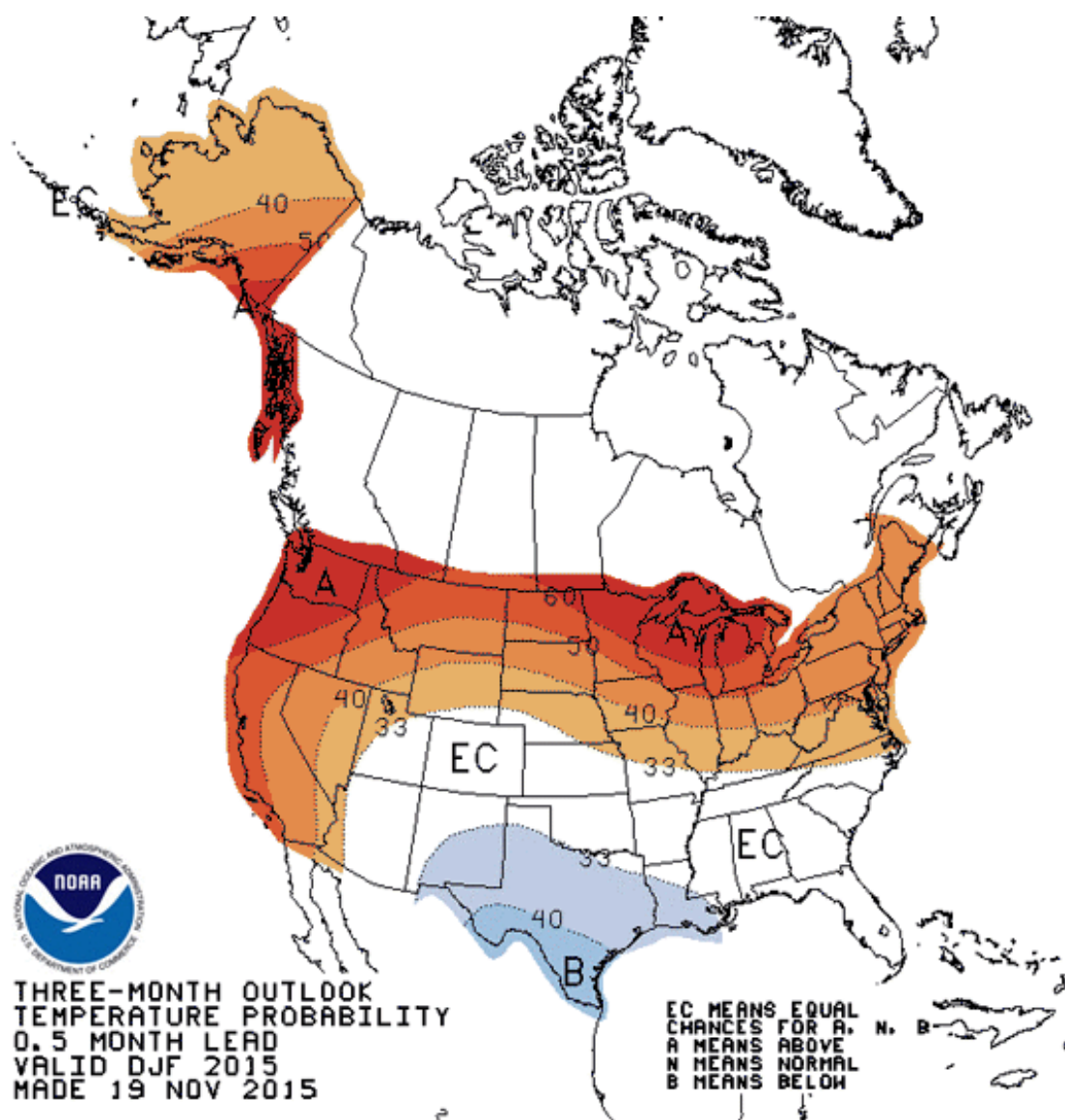
4. Winter weather outlook for Kansas

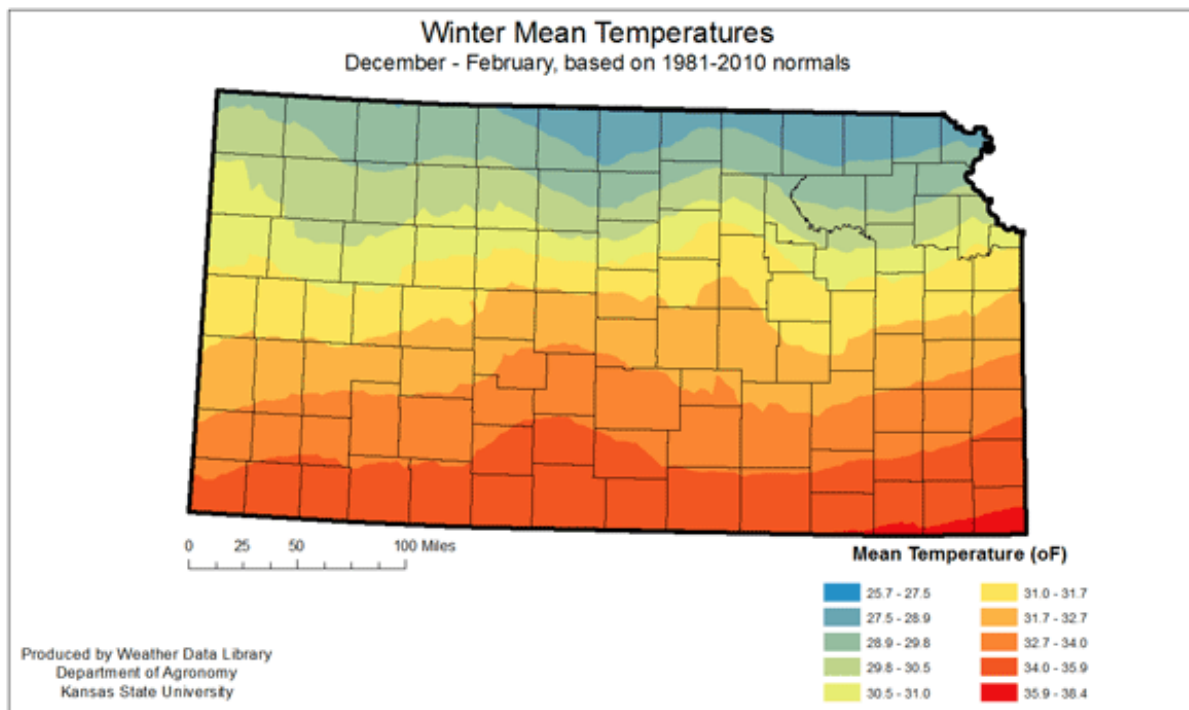
Snow and cold temperatures this week in the western parts of Kansas have sparked interest in what the winter might bring. Meteorologically, winter is defined as the period from December through February. As this year has shown, it is very possible to have winter conditions earlier -- as early as September in the Northwest. It is also possible for those winter conditions to persist into March or even April.

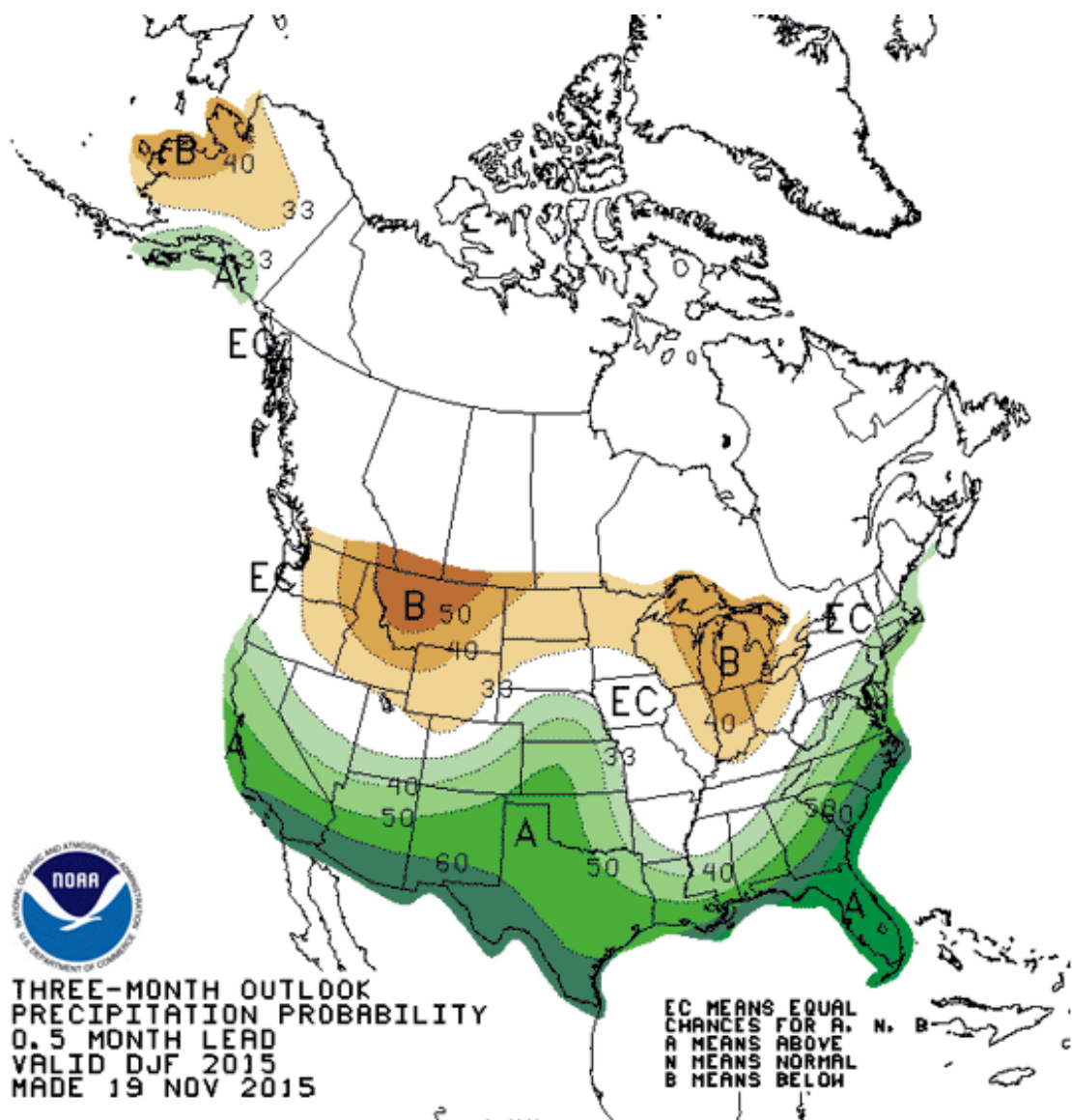
The outlook for December (the first part of the season) calls for equal chances on the temperatures. This means that it is equally likely for temperatures to be above or below average. The precipitation pattern for December is clearer, with an increased chance of above-normal precipitation. It is important to note that the outlook doesn't indicate by how much the weather might be wetter.

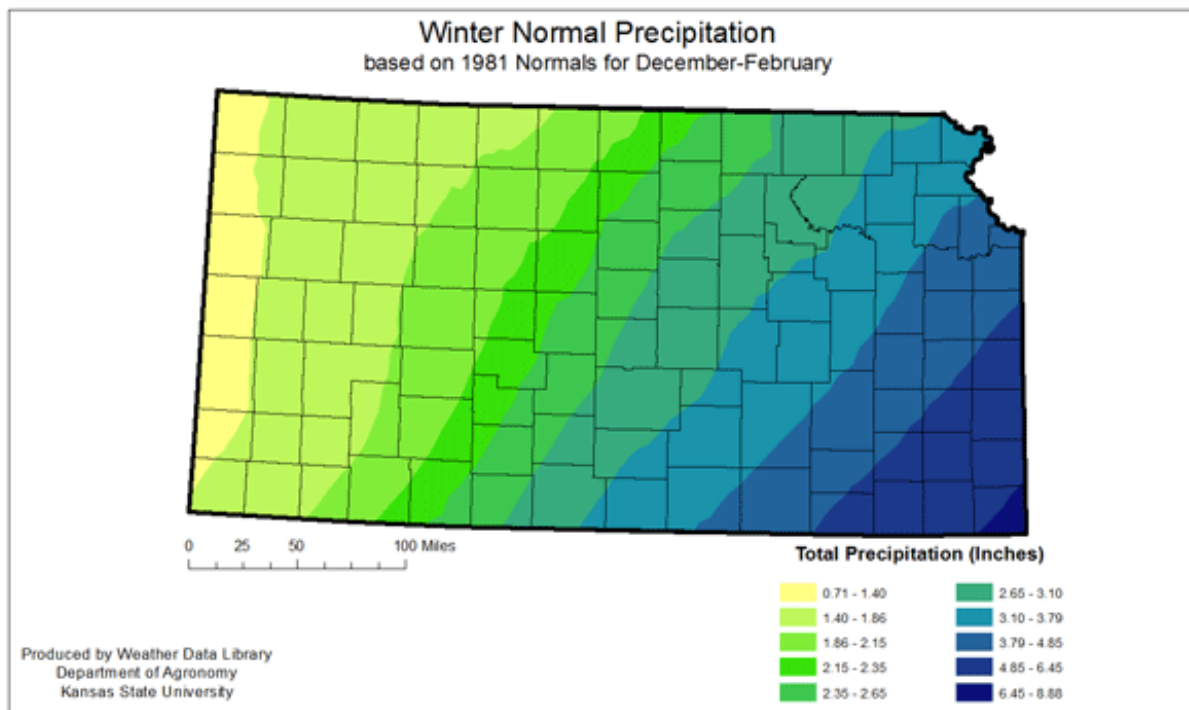
As the outlook is extended to the full winter season, the temperature outlook remains neutral. However, the tilt towards wetter-than-normal conditions is stronger. The pattern continues to be strongest in the western divisions.

The El Niño continues to be strong, among the strongest on record. An El Niño generally favors wetter-than-normal conditions in the Central Plains. The ridging pattern along the western Rockies is also expected to continue. This has resulted in a split pattern, with the Central Plains as the dividing line. Warmer-than-normal conditions are to the west, while cooler-than-normal conditions are in place to the east.









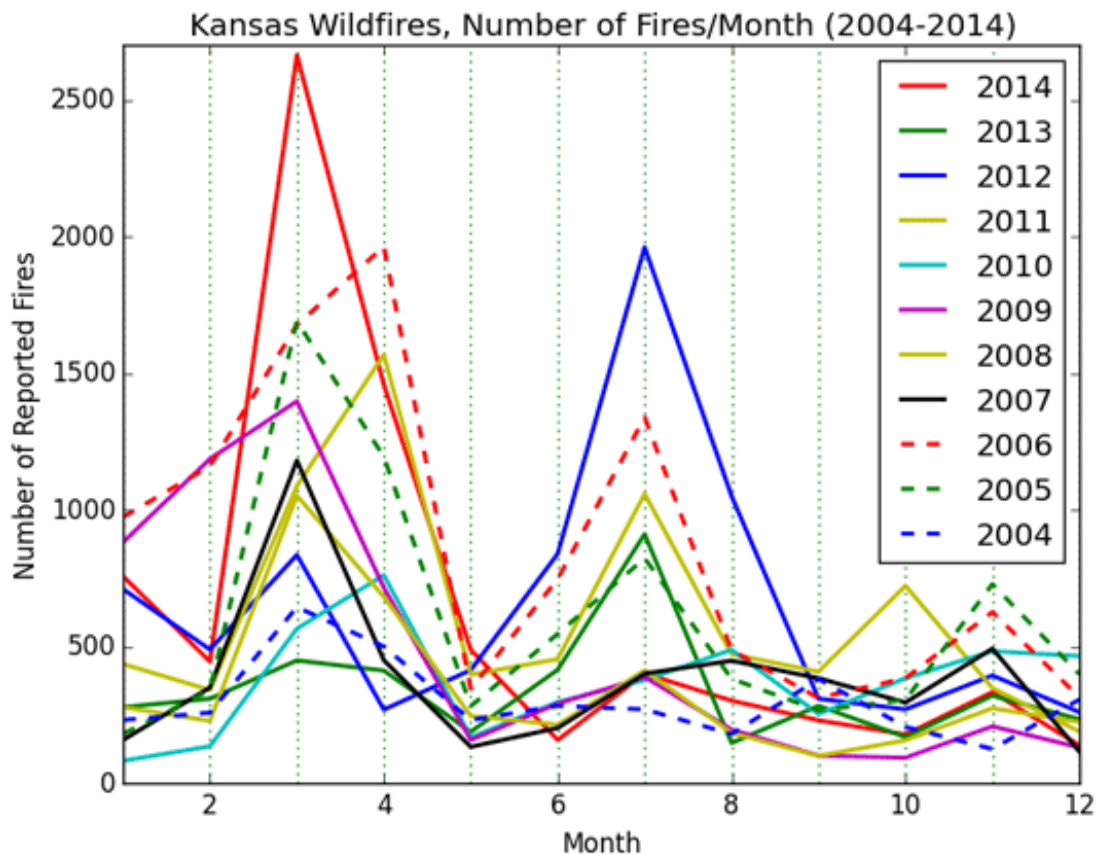
Mary Knapp, Weather Data Library
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5. Kansas wildfire weather analysis for 2014

Fire is used for many reasons across Kansas for positive results. However, fires that are uncontrolled can have very negative impacts, including property damage and personal injury. When these fires, often called wild land fires or wildfires, occur fire departments are called upon to extinguish them. Unfortunately, when weather conditions and fuels allow for ideal burning environments using prescribed fire, conditions are also sufficient for wildfires. This article focuses on analyzing wildfires of 2014 and the weather conditions that occurred near the time of the fires.

Kansas Fire Incident Reporting System (KFIRS) provides a method of submitting and archiving calls/incidents by fire departments. Incidents can be classified by type (structure fire, car accidents, and grass/vegetation/wildland fires) with additional descriptive details if the departments decide to include them. This archived data is an excellent resource for analysis of different influencing trends, anomalies, and various other impacts on different incidents, including wildfires.

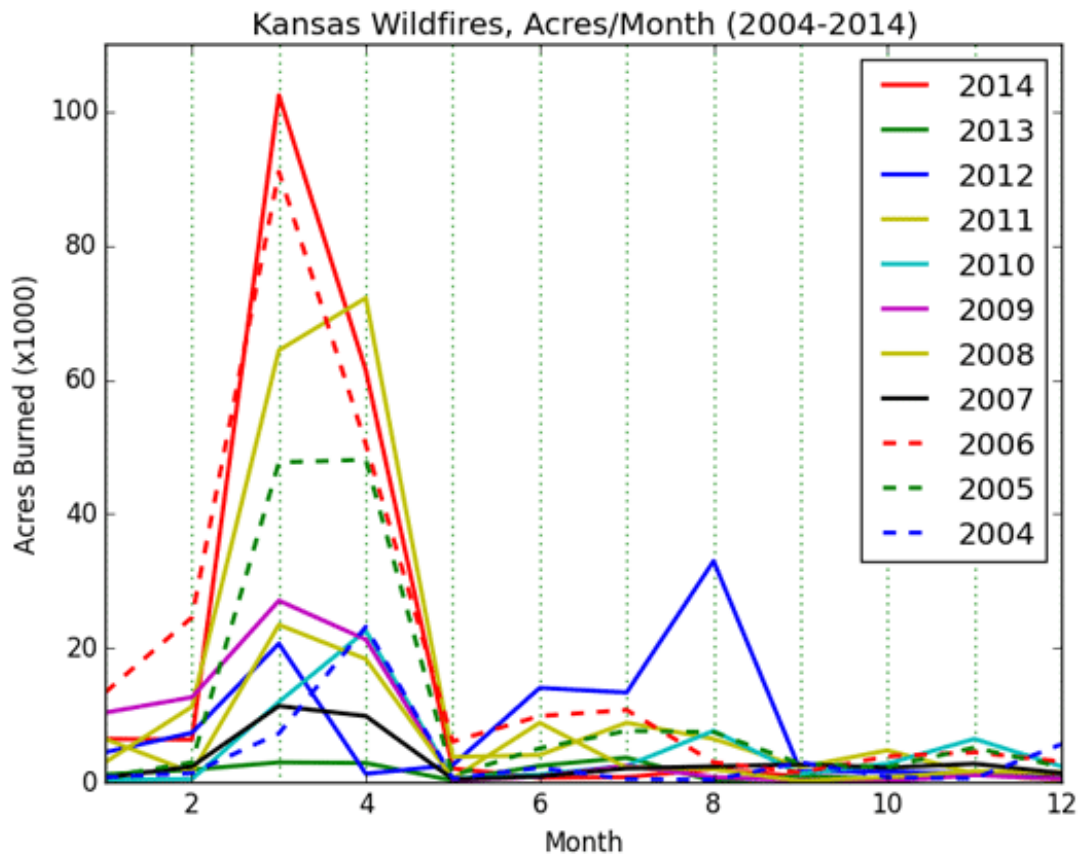
Of the eleven years of recorded KFIRS data, 2014 had both the most land area burned (187,500 acres) and the highest number of reported fires (8,075) in a year. In both land area and number, fires followed the typical curve of the previous 10 years, with a peak during the spring months of March and April (see charts below).



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This trend of spring wildfires coincides very well with prescribed burning season. Early spring is typically characterized by dead/cured fuels, warming temperatures, low relative humidity, and little precipitation. Often, if the late fall and winter are below normal in precipitation and/or the region is in a drought, these spring conditions are enhanced – providing explosive conditions for fire growth.

This was the case entering 2014. However, conditions were worsened by an increased fuel load from late summer rains of 2013 that brought some relief to the prolonged drought which peaked in 2012. These combined factors led to a peak of 156,600 acres burning in March/April 2014 alone. Of the 61 days possible in March and April, almost half (29) had more than 1000 acres burned statewide each day. Two days (Jan. 26 and Feb. 19) occurred outside of these months. Below, the March/April calendar with red days were those in which more than 1000 acres statewide were burned. Cold frontal passages throughout the period are marked on their associated day.

March/April 2014 Acres Burned per Day						
SUN	MON	TUE	WED	THU	FRI	SAT
23 258	24 232	25 89	26 146	27 527	28 276	1 82
2 371	3 5	4 60	5 11	6 111	7 789	8 118
9 1538	10 2484	11 7690	12 1207	13 7962	14 1994	15 7389
16 461	17 347	18 879	19 879	20 17753	21 5167	22 3787
23 4088	24 376	25 1060	26 1277	27 272	28 301	29 10782
30 11083	31 12062	1 1299	2 2785	3 256	4 973	5 5431
6 815	7 1140	8 608	9 2212	10 7002	11 13964	12 10445
13 236	14 385	15 1595	16 1066	17 432	18 5286	19 2298
20 30	21 1498	22 529	23 597	24 4	25 133	26 277
27 16	28 31	29 2	30 28	1 51	2 139	3 364

On days with more than 1,000 acres burned, weather data from the average start time in the central county of the fire activity were taken. This data consisted of Remote Automated Weather Stations (RAWS), Automated Surface Observing Stations (ASOS), Automated Weather Observing System (AWOS), and Kansas Mesonet (mesonet.ksu.edu) hourly data observations. Using relative humidity (RH), temperature, and wind speed observations, each location was analyzed according to its proximity to a frontal boundary. Categories were classified "Frontal Passage" if there was a frontal boundary at the focus of fire activity location and time, "Pre-Frontal" or "Post-Frontal" when it was located within 100 miles ahead/behind a front, "No frontal boundary at time of fire" if no boundary was within 100 miles at the time, or "No frontal boundary" when no frontal boundary was within 100 miles to center 24 hours before/after average ignition.

National Weather Service (NWS) Topeka (TOP) will typically issue a Red Flag Warnings (RFW) on days of critical fire danger. These RFWs are issued when fuels are cured or dead -- combined with winds greater than 15mph and RH less than 20% -- forecasted for three or more hours. A RFW issuance warns the public of fire risk and is used to create awareness of dangers involved.

Applications of a RFW include helping fire managers determine whether to put fire on the ground during a prescribed burn, helping individuals decide on participation of outdoor activities that include fire/sparks (campfires, shooting guns), and helping fire departments evaluate required staffing needs. These thresholds provide an excellent method to evaluate volatile weather conditions. However, criteria varies from region to region depending on the NWS office, and since

Location	Wind	Temp	RH	RFW
Flint Hills	15-25	65-75	45-55	Red
Neosho	10-20	60-70	50-60	Yellow
Lawrence	12-22	62-72	48-58	Yellow
Wichita	14-24	64-74	46-56	Yellow
Topeka	16-26	66-76	44-54	Yellow
Manhattan	18-28	68-78	42-52	Yellow
Shawnee	20-30	70-80	40-50	Yellow
Overland Park	22-32	72-82	38-48	Yellow
Lenexa	24-34	74-84	36-46	Yellow
Blue Springs	26-36	76-86	34-44	Yellow
Lee's Summit	28-38	78-88	32-42	Yellow
Independence	30-40	80-90	30-40	Yellow
St. Joseph	32-42	82-92	28-38	Yellow
Lawrenceville	34-44	84-94	26-36	Yellow
Lawrenceburg	36-46	86-96	24-34	Yellow
Lawrenceville	38-48	88-98	22-32	Yellow
Lawrenceville	40-50	90-100	20-30	Yellow

the majority of fire foci were in/around the Flint Hills, only TOP RFW criteria were considered.

From 2014 results, during any of the weather periods considered, none of them reach RFW criteria. While some (Frontal boundary – wind, Post-frontal – RH) reach individual criteria (red shaded values in the table), the combination is required to issue a RFW which heightens public/manager risk awareness.

2014 was a record year in both land burned and number of fires. With the majority of fires/acreage occurring on non-RFW days, some additional research is required to evaluate why these fires are happening. Many possibilities exist, including: the need for better/increased thoroughness of reporting of cause, size, and circumstance of each wildfire; higher resolution weather data; social aspects of prescribed burning; evaluation of null events (no fires) on RFW days; and implications of public/manager decisions based off weather data and their subsequent results.

The analysis done for 2014 was meant to organize a scientific approach to compiling a database of correlated weather and wildfire data never done before. In the coming months, more research will be done using the other 10 years with available data to develop a climatology of fire weather conditions and to determine the anomalies and patterns in Kansas.

For further reading on this research, see the 2014 KFIRS report:

<https://firemarshal.ks.gov/docs/default-source/default-document-library/what-the-ks-fire-service-did-in-2014.pdf?sfvrsn=0>

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6. Comparative Vegetation Condition Report: November 3 - 16

K-State's Ecology and Agriculture Spatial Analysis Laboratory (EASAL) produces weekly Vegetation Condition Report maps. These maps can be a valuable tool for making crop selection and marketing decisions.

Two short videos of Dr. Kevin Price explaining the development of these maps can be viewed on YouTube at:

<http://www.youtube.com/watch?v=CRP3Y5Nlggw>

<http://www.youtube.com/watch?v=tUdOK94efxc>

The objective of these reports is to provide users with a means of assessing the relative condition of crops and grassland. The maps can be used to assess current plant growth rates, as well as comparisons to the previous year and relative to the 26-year average. The report is used by individual farmers and ranchers, the commodities market, and political leaders for assessing factors such as production potential and drought impact across their state.

NOTE TO READERS: The maps below represent a subset of the maps available from the EASAL group. If you'd like digital copies of the entire map series please contact Nan An at an_198317@hotmail.com and we can place you on our email list to receive the entire dataset each week as they are produced. The maps are normally first available on Wednesday of each week, unless there is a delay in the posting of the data by EROS Data Center where we obtain the raw data used to make the maps. These maps are provided for free as a service of the Department of Agronomy and K-State Research and Extension.

The maps in this issue of the newsletter show the current state of photosynthetic activity in Kansas, the Corn Belt, and the continental U.S., with comments from Mary Knapp, assistant state climatologist:

Kansas Vegetation Condition

Period 46: 11/03/2015 - 11/16/2015

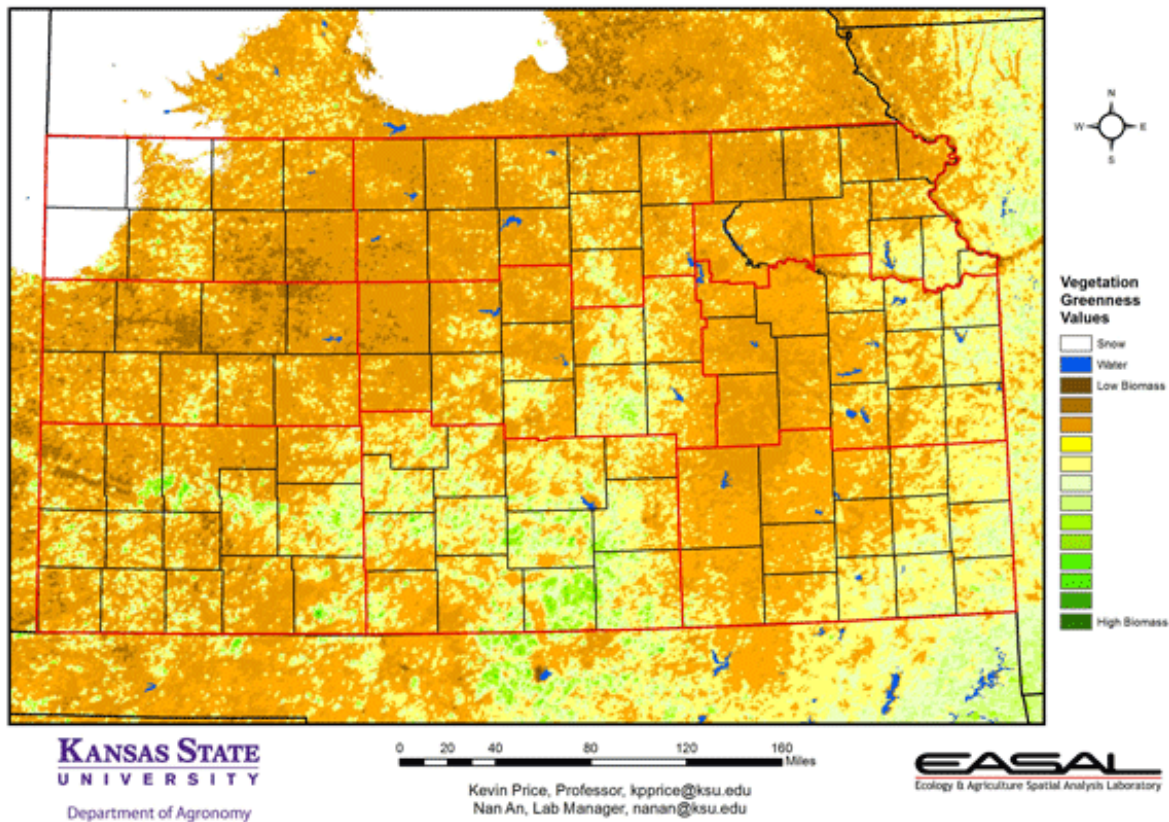


Figure 1. The Vegetation Condition Report for Kansas for November 3 – November 16 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the area of highest biomass production continues to be a small pocket along the Arkansas River in southwest Kansas and into the South Central Division. The area of very low NDVI values in Trego, Ellis, Rush, and Ness counties has shrunk, although moderate drought conditions persist. The most recent snow won’t show until the next mapping interval.

Kansas Vegetation Condition Comparison

Early-November 2015 compared to the Early-November 2014

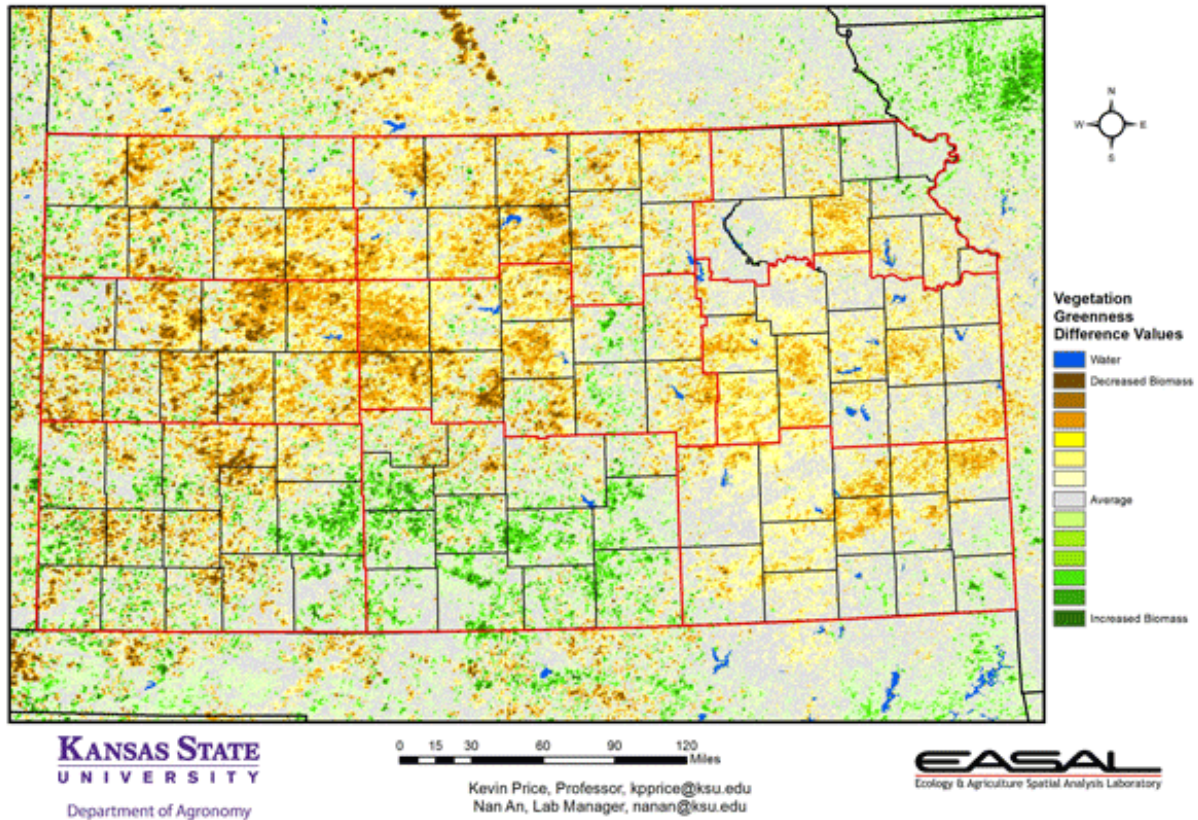
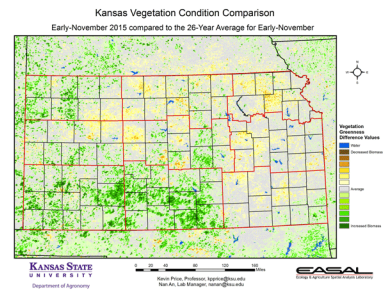


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for November 3 – November 16 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows much of the state with lower photosynthetic activity. Only the Southwest and South Central Divisions continue to have higher photosynthetic activity this year. These areas continue to have beneficial moisture, while the rest of the state has been dry. Rains from last week have reduced the area of moderate drought conditions, but the



impact of rains from this week have yet to appear on these maps.

Figure 3. Compared to the 26-year average at this time for Kansas, this year's Vegetation Condition Report for November 3 – November 16 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows that most of the state continues to show near-average photosynthetic activity. The Southwest and South Central Divisions have the largest areas of above-average photosynthetic activity as moisture continues to be above average and temperatures remain favorable. Recent moisture in the Northwest Division has also favored higher photosynthetic activity there. Areas of below-average photosynthetic activity continue to shrink, as moisture is more widespread and we move into the dormant season.

U.S. Corn Belt Vegetation Condition

Period 46: 11/06/2015 - 11/16/2015

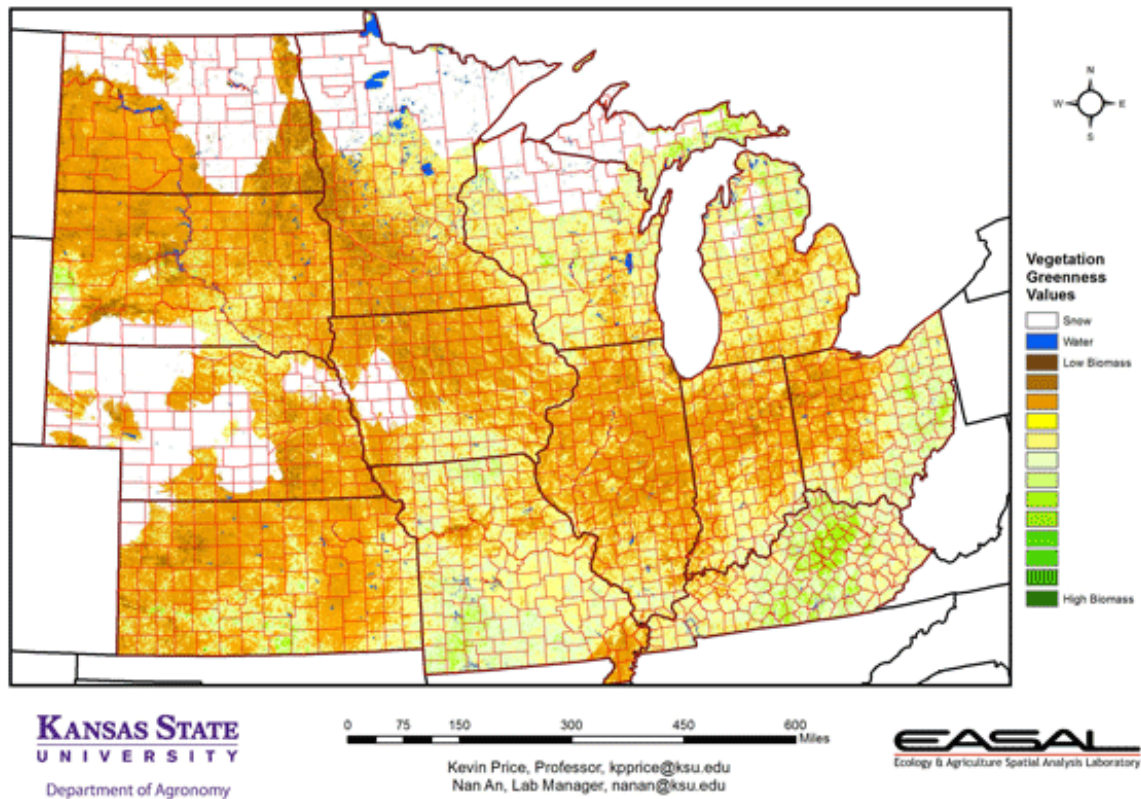


Figure 4. The Vegetation Condition Report for the Corn Belt for November 3 – November 16 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the area of greatest photosynthetic activity is concentrated in the southern parts of the region. Favorable moisture conditions in these areas have resulted in high photosynthetic activity. Snow continues to appear in the northern parts of the region, although this map doesn’t reflect the most recent storm.

U.S. Corn Belt Vegetation Condition Comparison
Early-November 2015 Compared to Early-November 2014

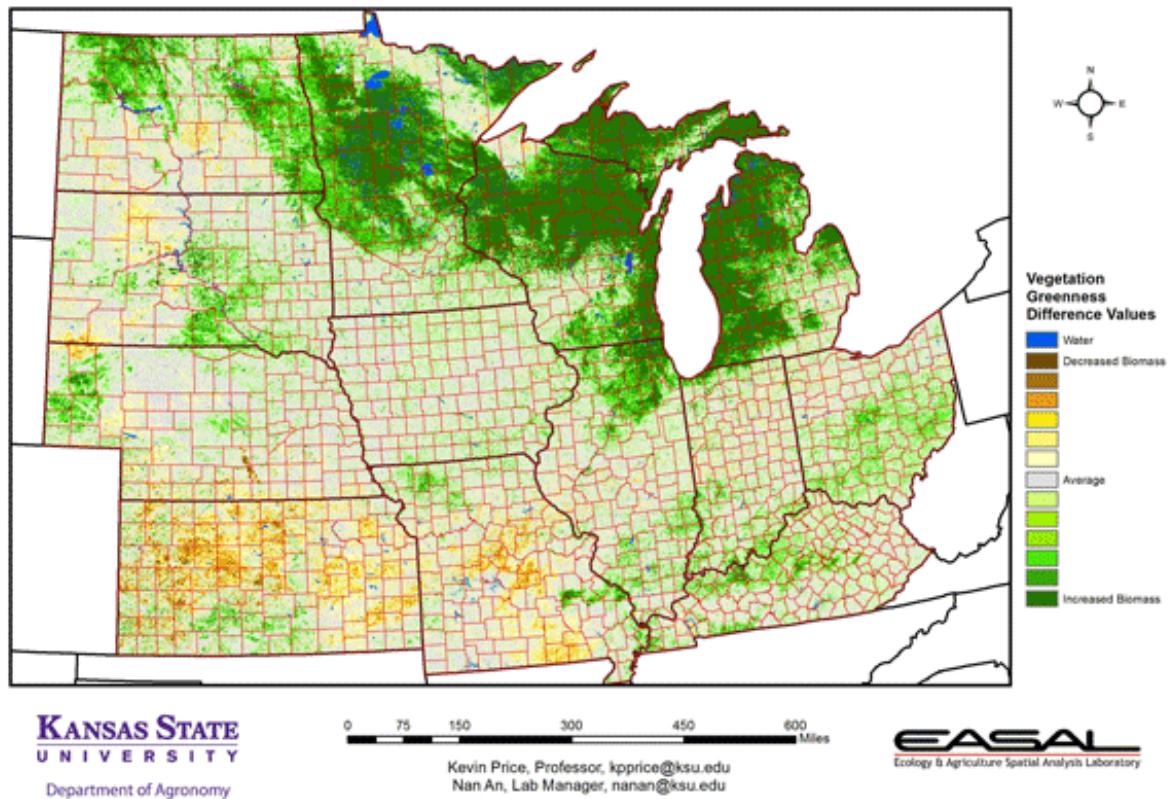


Figure 5. The comparison to last year in the Corn Belt for the period for November 3 – November 16 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows lower photosynthetic activity centered in the Central Plains, although this area of lower activity has become smaller due to recent moisture. There is a large area of higher NDVI values in northern Wisconsin and the Upper Peninsula of Michigan, where moisture has been more favorable this year

U.S. Corn Belt Vegetation Condition Comparison
Early-November 2015 Compared to the 26-Year Average for Early-November

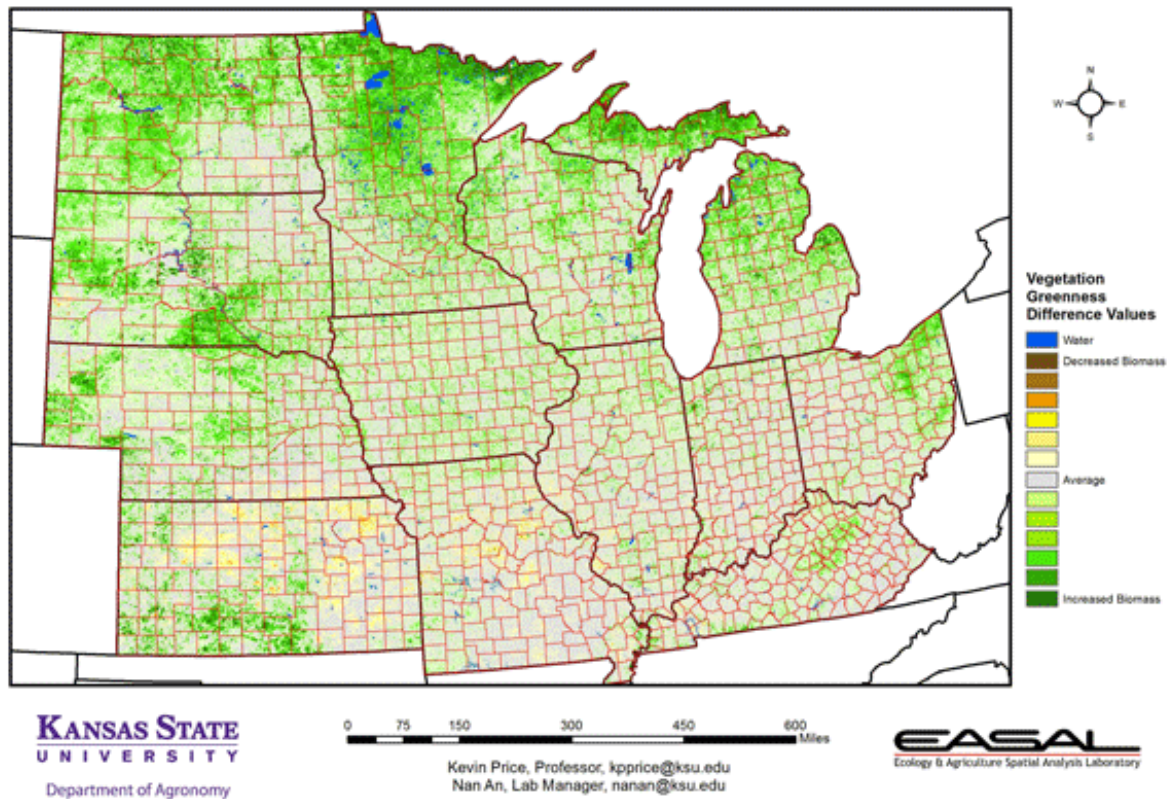


Figure 6. Compared to the 26-year average at this time for the Corn Belt, this year's Vegetation Condition Report for November 3 – November 16 from K-State's Ecology and Agriculture Spatial Analysis Laboratory shows most of the region has average biomass production. Above-average photosynthetic activity can be seen in the northern and western areas of the region, where temperatures have continued mild and moisture has been favorable. Areas of below-average photosynthesis continue to shrink, as we move out of the growing season.

Continental U.S. Vegetation Condition

Period 46: 11/03/2015 - 11/16/2015

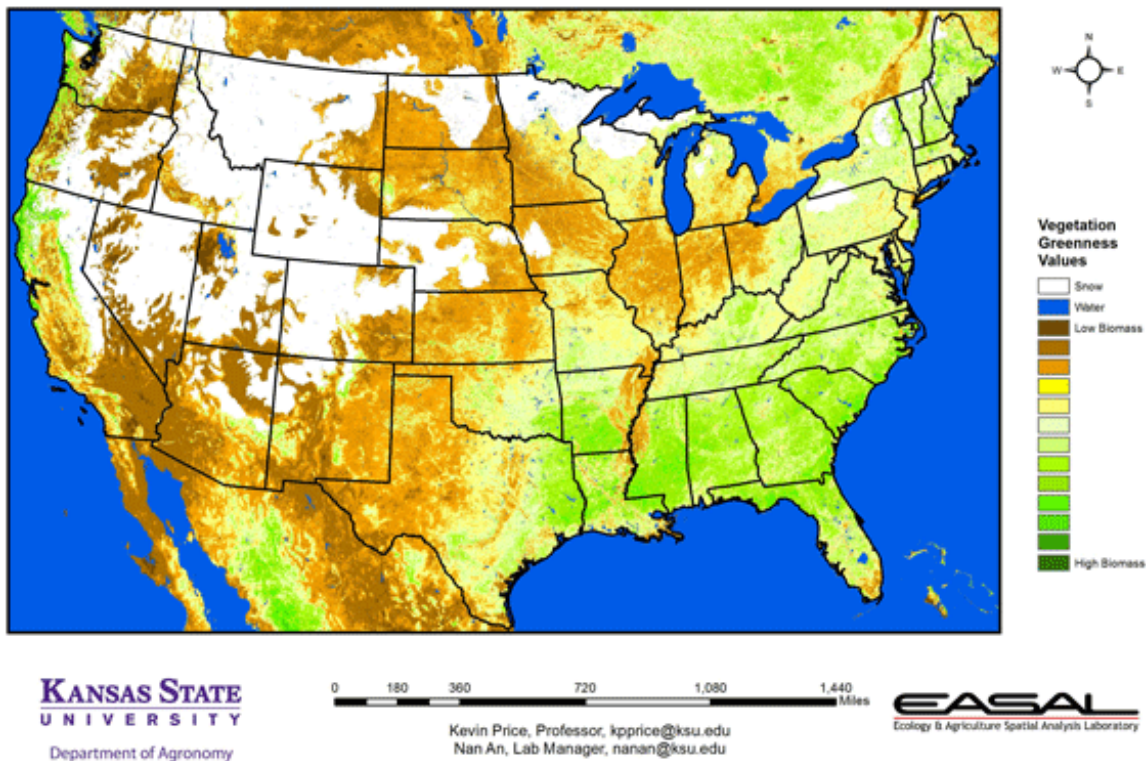


Figure 7. The Vegetation Condition Report for the U.S for November 3 – November 16 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that the highest level of photosynthetic activity is in the Deep South, where favorable temperatures have extended the growing season. An early storm system has brought more snow to the Mountain West, although much more is needed to address the long-term deficits. Low NDVI values are noticeable the Ohio River Valley and along the Mississippi River, where crops have matured early, and flooding continues to be an issue.

Continental U.S. Vegetation Condition Comparison
Early-November 2015 Compared to Early-November 2014

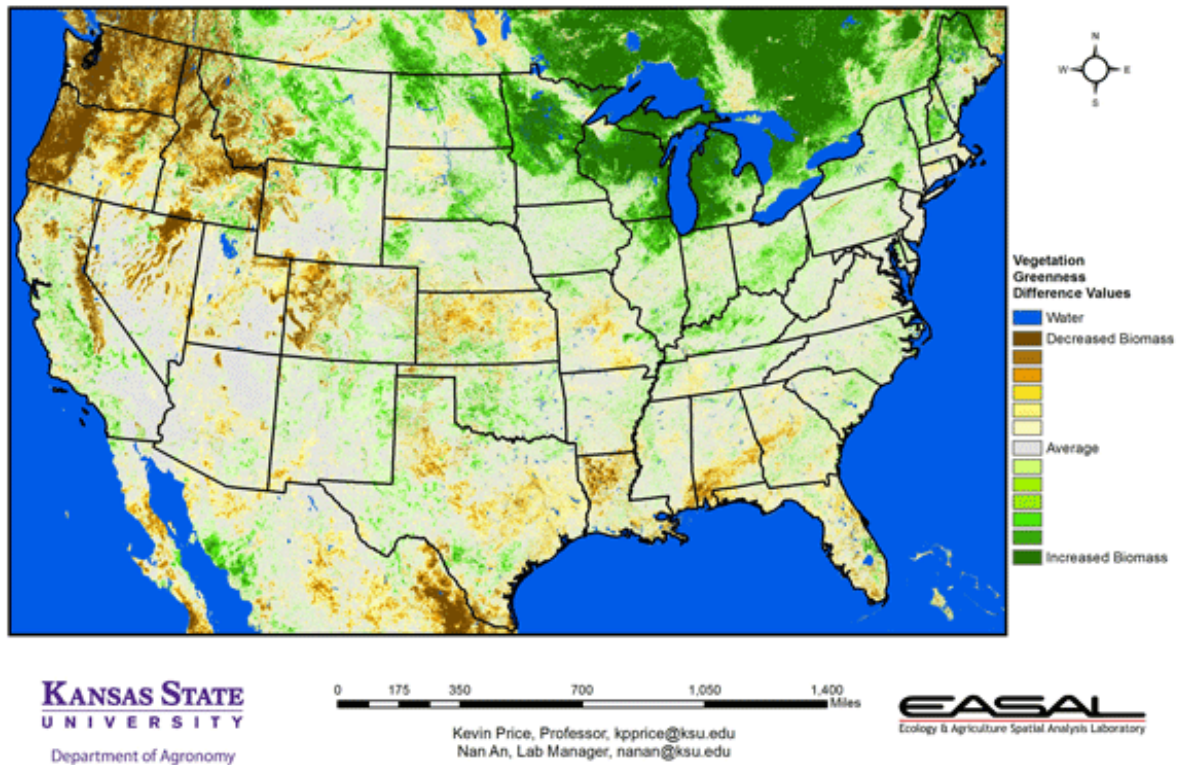


Figure 8. The U.S. comparison to last year at this time for the period November 3 – November 16 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows that lower NDVI values are most evident in the Pacific Northwest, while much higher NDVI values are visible in the Great Lakes region. Snow is the major driver for both. The Great Lakes area has seen a late start to the snow season, while the Pacific Northwest has a higher snow pack than last year. Continuation of this snowy pattern will be essential for significant drought relief.

Continental U.S. Vegetation Condition Comparison
Early-November 2015 Compared to 26-year Average for Early-November

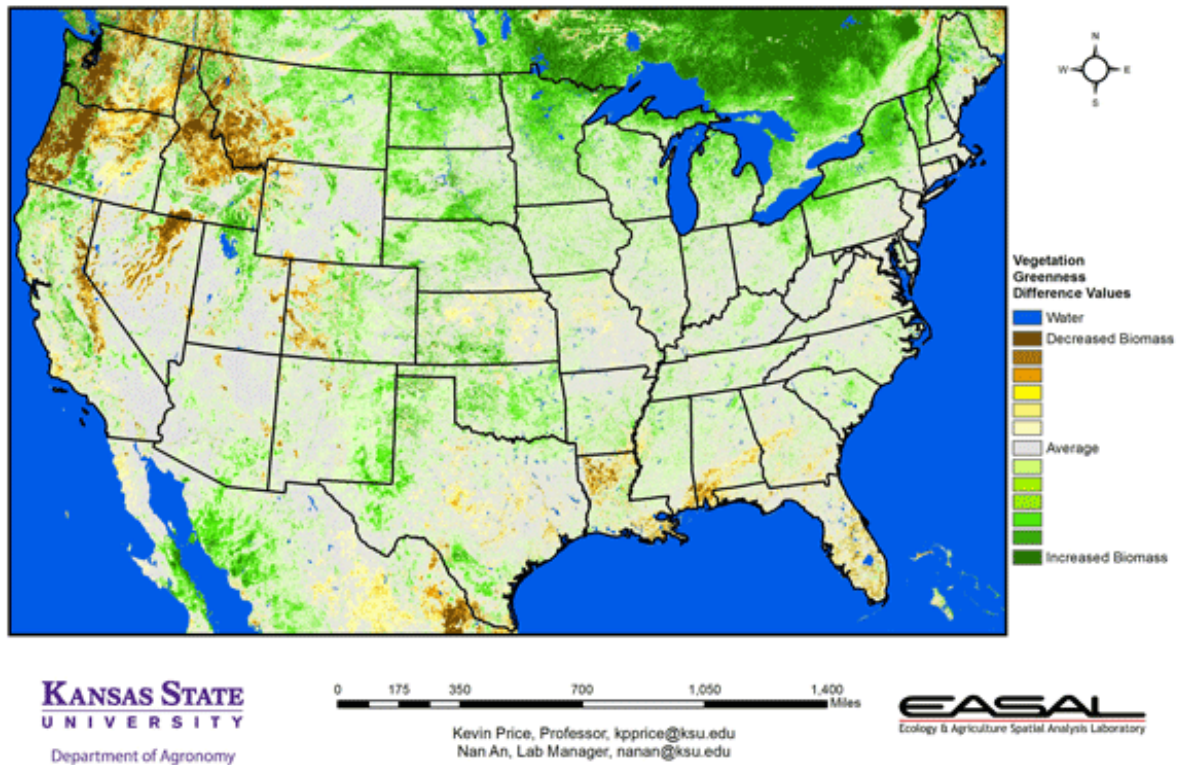


Figure 9. The U.S. comparison to the 26-year average for the period November 3 – November 16 from K-State’s Ecology and Agriculture Spatial Analysis Laboratory shows much below-average photosynthetic activity in western Washington and Northern Idaho. Decreases in photosynthetic activity in both of these areas are due largely to a very wet pattern over the last two weeks.

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