

Kansas Wheat Yield Outlook for 2022 - Week #22 (6/5/22)

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Introduction

The USDA collects weekly crop conditions throughout the growing season. The crop is rated as either: very poor, poor, fair, good, or excellent. These crop condition reports can be used in a model to help forecast yields. This procedure to estimate yields is detailed in Ibendahl's AgManager report "Kansas Wheat Yield Outlook for 2022 - Week 47" (<https://www.agmanager.info/production-economics/production-publications/kansas-wheat-yield-outlook-2022-week-47>).

As of week 22 (week ending 6/5/22) in Kansas, for the winter wheat crop, 41% was rated either very poor or poor, 30% was fair, 29% was either good or excellent. Despite the rains in some parts of Kansas over the last two weeks, crop conditions remain poor. The percentage of wheat in the poor and very poor categories is nearly identical to two weeks ago. There was a little improvement in the good and excellent categories as 4% of the fair wheat moved up to the higher categories.

As detailed in the report from two weeks ago, NASS is forecasting total production of 271M bushels while the Wheat Quality Council is forecasting 261M bushels. Ibendahl's estimate from two weeks ago was 270M bushels.

Estimate of Crop Condition

The crop conditions are used to construct a CCI score:

$$\begin{aligned} \text{CCI Index} = & (\% \text{ acreage Excellent}) * 1 + \\ & (\% \text{ acreage Good}) * 0.75 + \\ & (\% \text{ acreage Fair}) * 0.50 + \\ & (\% \text{ acreage Poor}) * 0.25 + \\ & (\% \text{ acreage Very poor}) * 0 \end{aligned}$$

The index ranges from [0, 100]. An index value of 100 corresponds to 100 percent of the surveyed crop being reported in excellent condition, and a value of 0 indicates 100 percent of the crop is in very poor condition. A value of 50 indicates the average crop condition for the state is in fair condition.

The CCI indexes are calculated for the last 30 years. These CCI indexes are then used in a regression analysis to estimate the wheat yield per acre where the yield is a function of

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the CCI index. To account for the yield trend, the actual model is an estimation of the deviation from the yield trend as a function of the CCI index. (Figure 1 show the historical wheat yields and the 30-year trend line). Figure 3 plots the deviation from the state average wheat yield tend line on the left axis and the CCI index on the bottom axis. The dark gray band represents the standard error. The standard error of the regression is the average distance that the observed values fall from the regression line.

Results

The model accuracy is improving as harvest gets closer. The model now has an R-squared of 0.56 compared to 0.50 two weeks ago. The estimated yield equation is

$$\text{Yield deviation from trend} = 0.42 * \text{CCI_score} - 22.17$$

That is, an improvement of 1% in the CCI score can increase the average state yield by 0.42 bushels per acres. The effect of the CCI score has increased throughout the growing season. While the model has improved over time, the low R-squared value is the result of large variations in the final wheat yield for a given CCI score. Wheat is just a difficult crop to predict yields. Ibendahl plans to do a similar model for corn and soybeans and these crops work better for predicting yields. The large variability can easily be seen in Figure 3.

The 2022 wheat crop, as of week #22, had a CCI score of 43.25 This translates into a 3.9 negative deviation from trend line yield. The trend line yield is 45.6 bu/ac so the wheat yield projection for 6/5/22 is 41.7 bu/ac. This is an improvement of 0.7 bu/ac from two weeks ago. Thus, while the rains didn't help the really poor wheat, the wheat in the fair category two weeks ago did benefit. The low R-squared value for the model means much could change before harvest. However, it is highly unlikely at this point that the state average yield will be normal.

In order to predict total Kansas wheat production, the harvested acres were estimated based on the amount of wheat in the very poor category. Using this additional model, Ibendahl estimates that only 89% of the planted acres will be harvested. At an 11% abandonment rate, 6.58M acres will be harvested. Combined with the yield prediction model, the expected production in Kansas is 275.6M bushels.

The estimate of 275.6M bushels is now above the NASS estimate of 271M bushels and the Wheat Quality Council estimate of 261M bushels. Ibendahl's model has a confidence interval from -6.02 to -1.71 bu/ac deviation from trend line yield. Thus the estimated range of total production could vary from 255M bu to 296M bu. This is a fairly large range reflecting the lower R-squared values and would encompass both the NASS and Wheat Council estimates.

Implications

Producers should look at these results as only a guide. While the recent rains have helped some producers, there will still be parts of the state with yields well below those predicted here. The recent rains have also helped the state average yield to some degree but this year will still be below average.

Given the closeness to harvest, this will be the last yield and production estimate for the year. Crop reports have just started for corn so Ibendahl will be moving to predicting yields for corn and soybeans soon.

Historical Kansas Wheat Yields

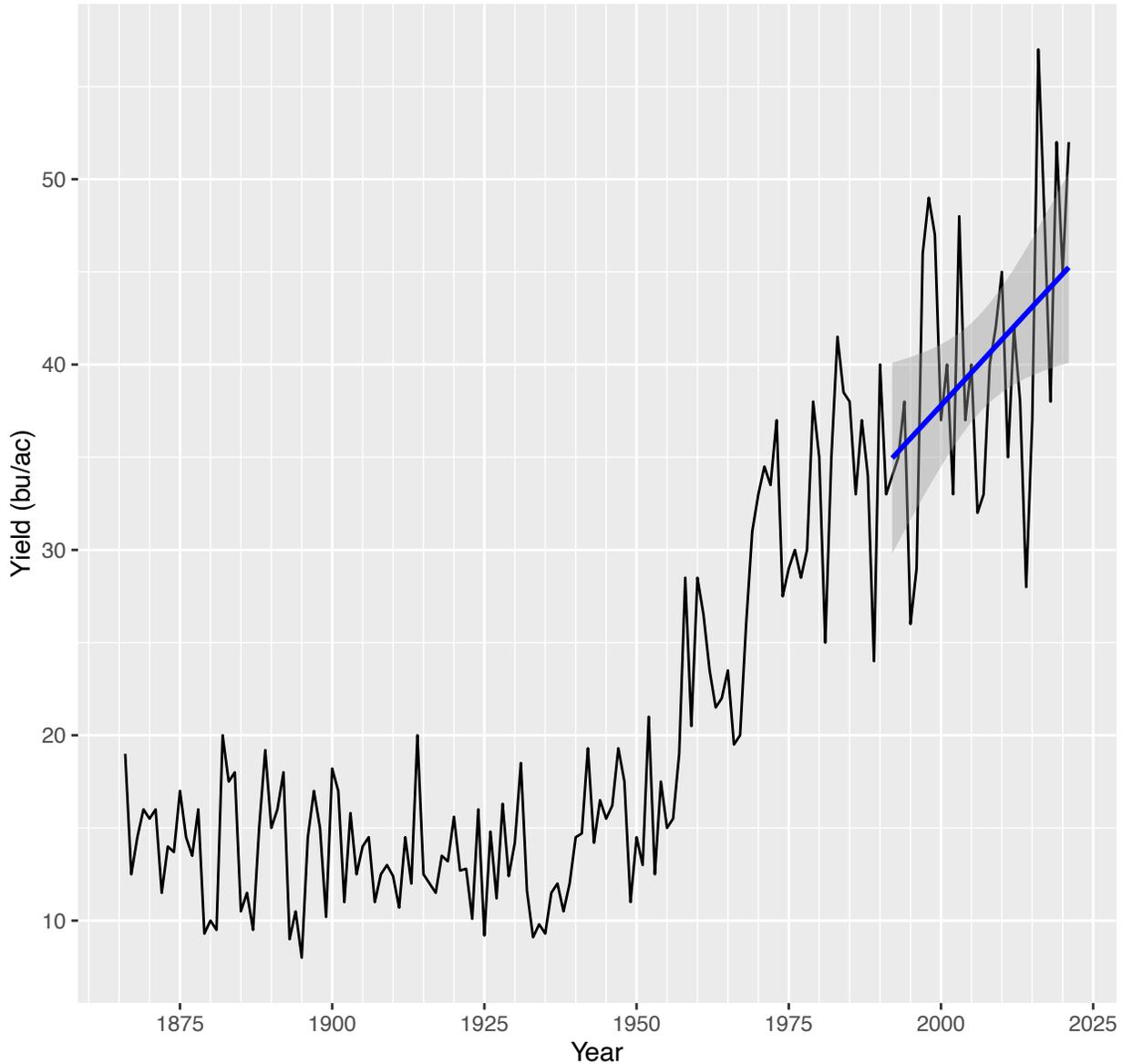


Figure 1. Historical State Wheat Yields from Kansas

Kansas State University – Department of Agricultural Economics

Condition of Kansas Wheat as of WEEK #22

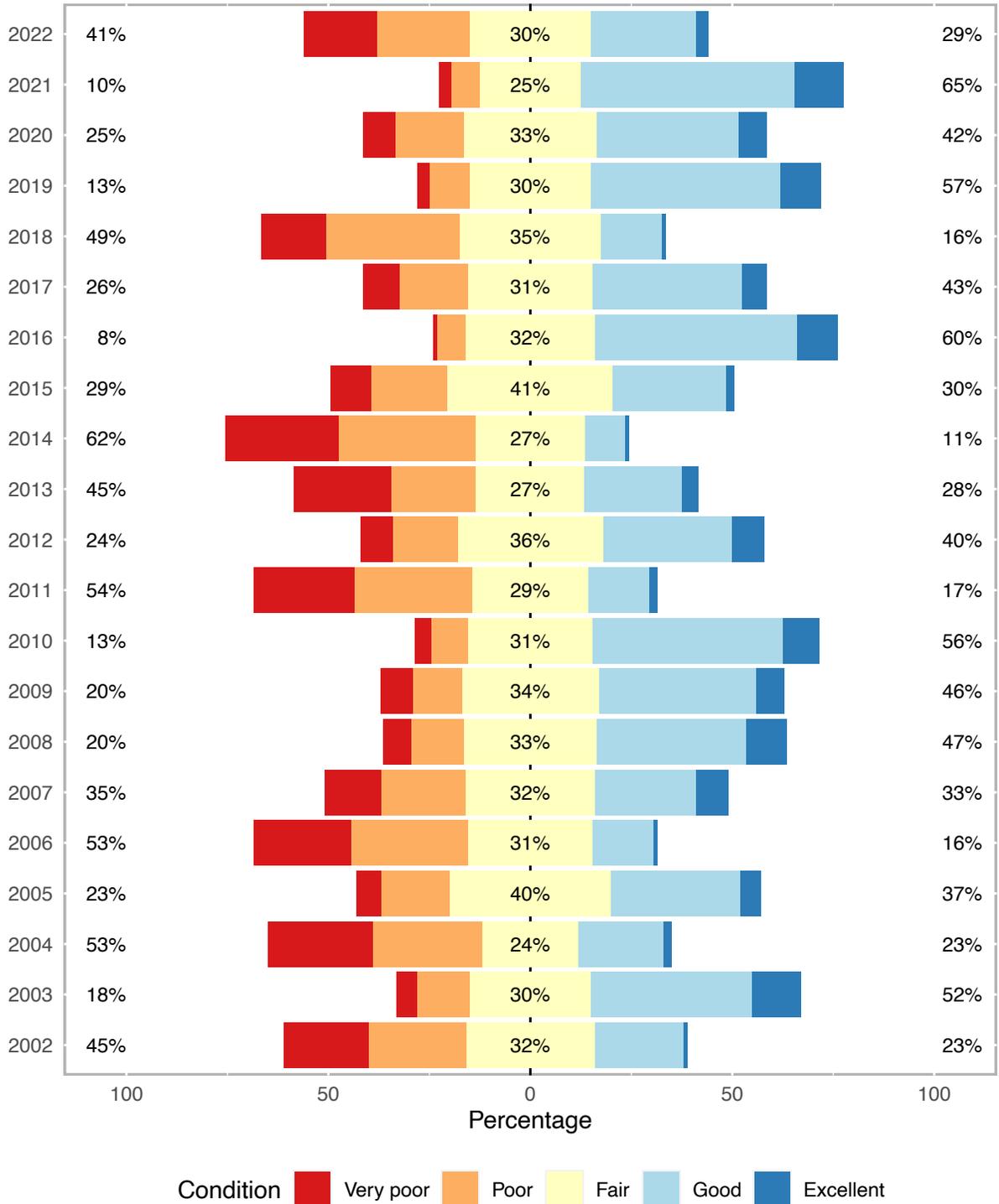


Figure 2. Historical Crop Conditions for Wheat in Kansas - 6/5/22

Yield Prediction Based on CCI Score
WEEK #22

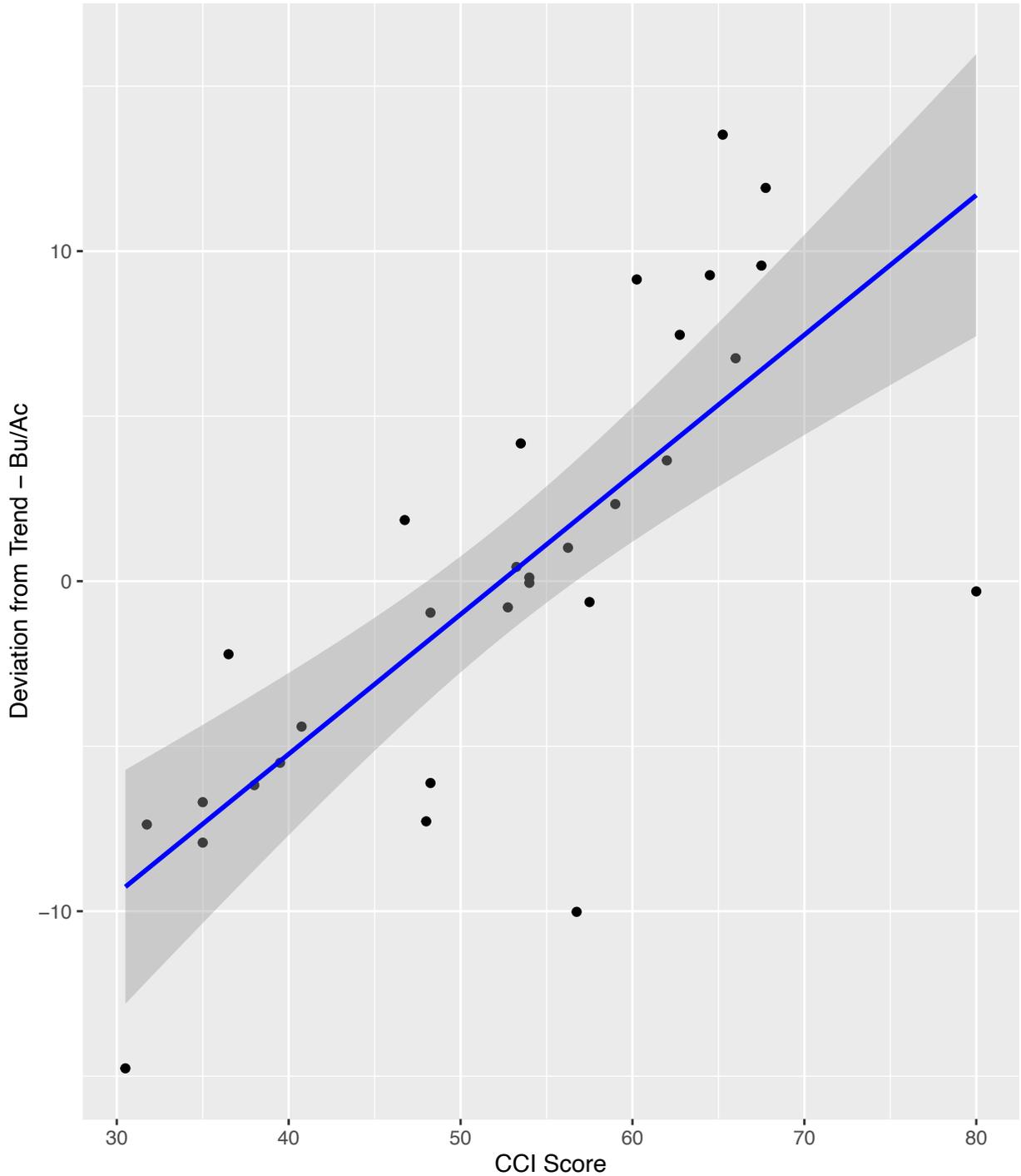


Figure 3. Expected Yield (Trend Deviation) for Various CCI Index Values - 6/5/22