Kansas Wheat Yield Outlook for 2022 - Week #18 (5/08/22)
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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 18 (week ending 5/08/22) in Kansas, for the winter wheat crop, 37% was rated either very poor or poor, 35% was fair, 28% was either good or excellent. Despite the rains in many parts of Kansas last week, crop conditions only improved slightly. The percentage of wheat in the very poor and poor categories only improved from 39% to 37%. The percentage of wheat in the good and excellent categories improved from 25% to 28%.

Estimate of Crop Condition

The crop conditions are used to construct a CCI score:

CCIndex = (% acreage Excellent) * 1 +
         (% acreage Good) * 0.75 +
         (% acreage Fair) * 0.50 +
         (% acreage Poor) * 0.25 +
         (% acreage Very poor) * 0

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 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 0.42 compared to 0.39 last week. The estimated yield equation is

Yield deviation from trend = 0.363 * CCI_score - 20.20

That is, an improvement of 1% in the CCI score can increase the average state yield by 0.37 bushels per acres. The effect of the CCI score will become more pronounced as the season progresses. While the model gets better across time, the low R-squared value is the result of large variations in the final wheat yield for a given CCI score. The large variability can easily be seen in Figure 3.

The 2022 wheat crop, as of week #18, had a CCI score of 44.5 This translates into a 4.1 negative deviation from trend line yield. The trend line yield is 45.6 bu/ac so the wheat yield projection for 5/08/22 is 41.5 bu/ac. While this predicted yield is higher than last week, it may not be as much as many were hoping given the rain last week. The low R-squared value for the model means much could change before harvest. The next few weeks are likely to greatly influence whether Kansas wheat yields are normal are below normal.

Implications

Producers should look at these results as only a guide. Now that crop reports come in weekly, this model will be update regularly and the reliability will improve as harvest gets closer.
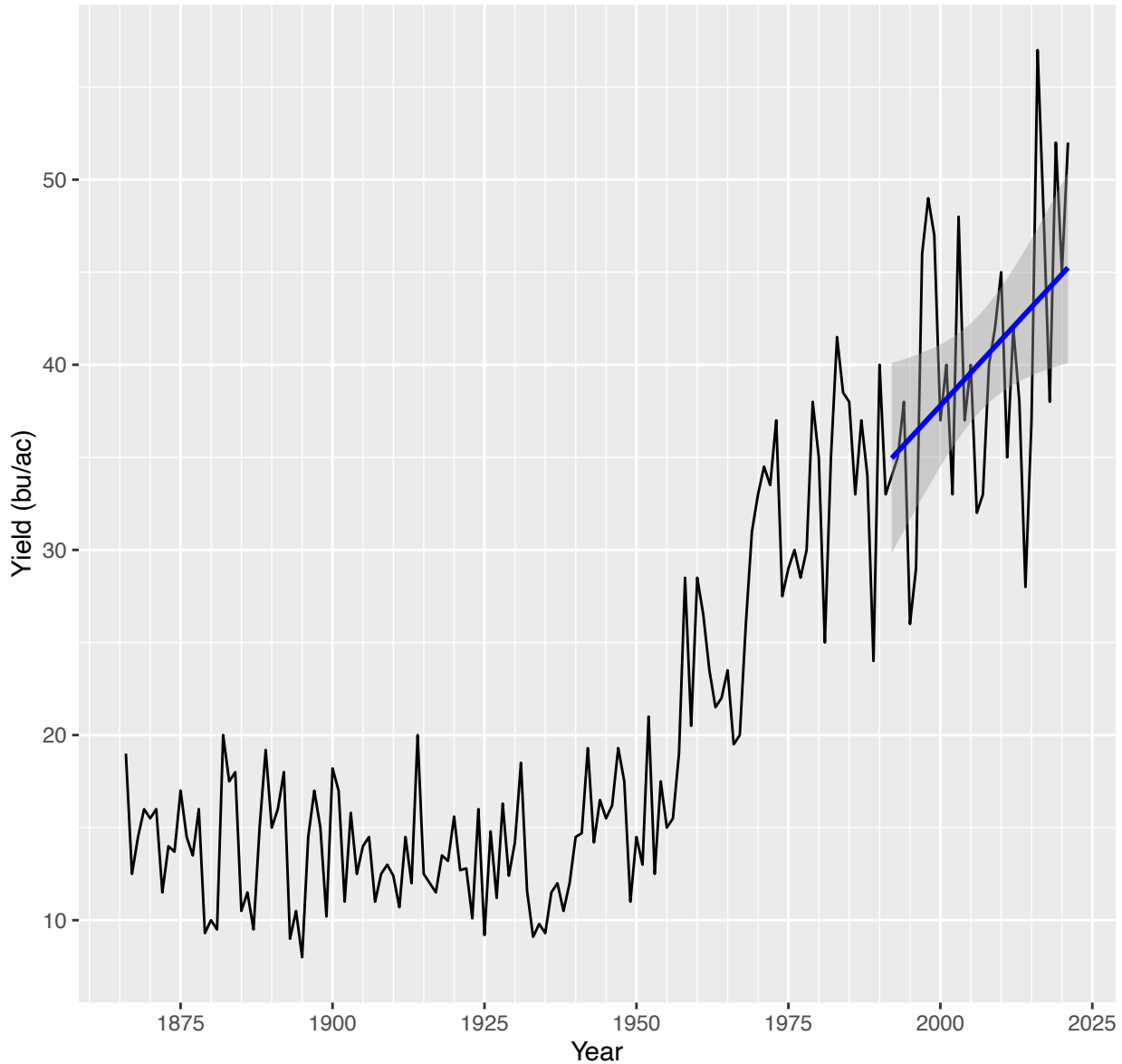
Historical Kansas Wheat Yields

Figure 1. Historical State Wheat Yields from Kansas
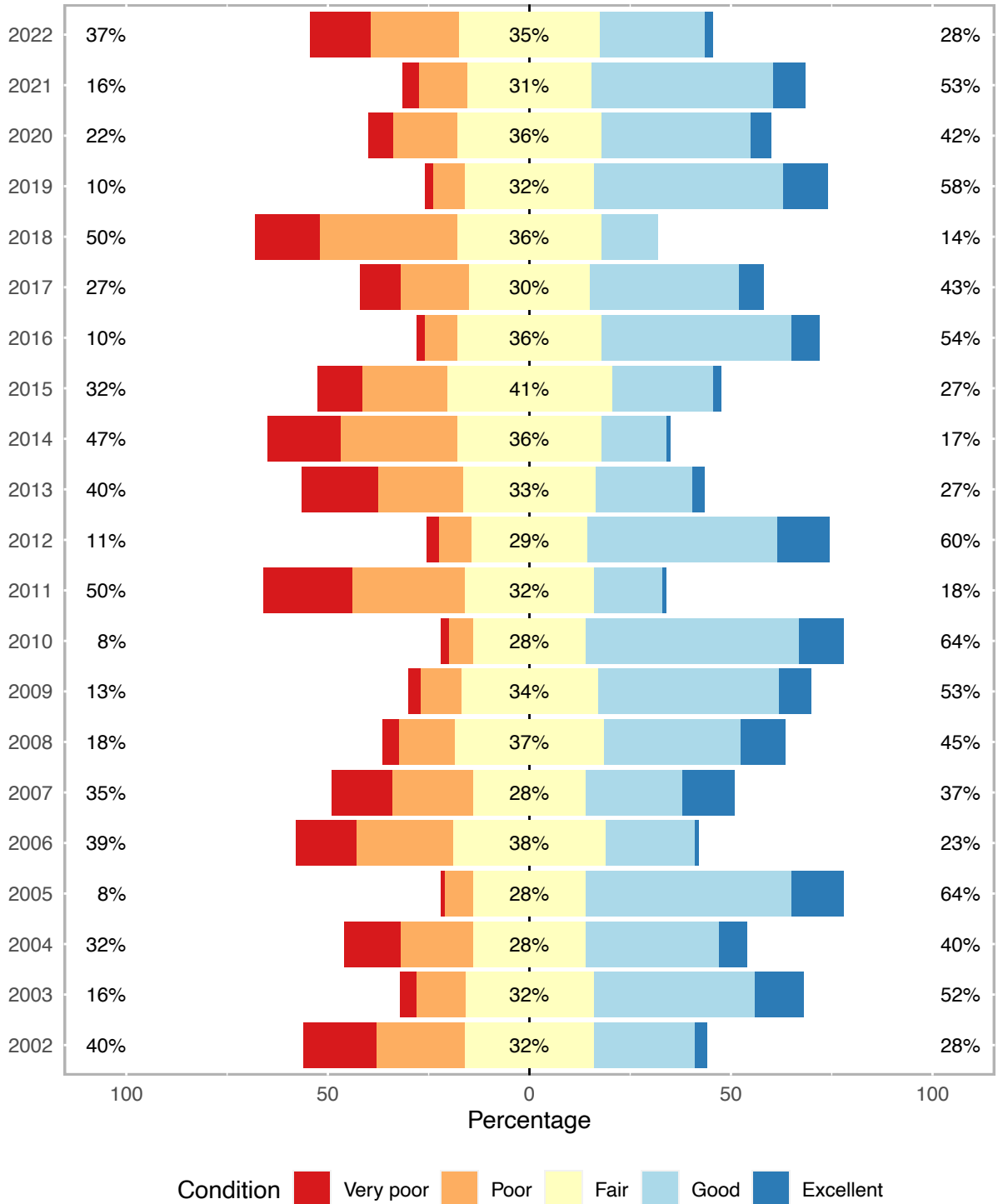
Condition of Kansas Wheat as of WEEK #18

Figure 2. Historical Crop Conditions for Wheat in Kansas - 5/08/22
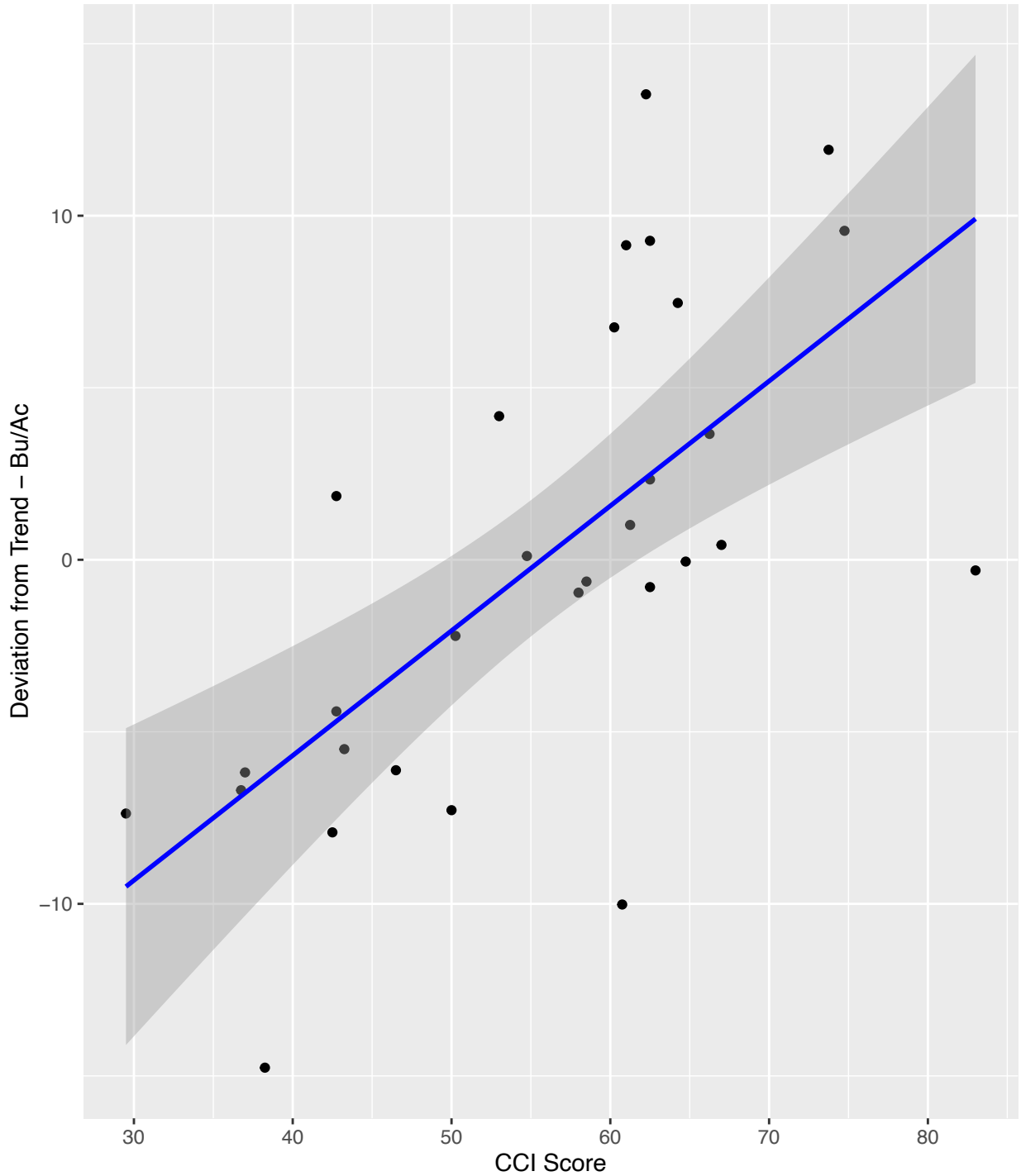
Yield Prediction Based on CCI Score
WEEK #18

Figure 3. Expected Yield (Trend Deviation) for Various CCI Index Values - 5/08/22