# Kansas Wheat Yield Outlook for 2025 (Week 7)

## Drought Monitor Data Analysis

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### Introduction [1]

This paper uses data from the U.S. drought monitor website (https://droughtmonitor.unl.edu[2]) to predict yields on a crop reporting district (CRD) level for Kansas. USDA crop condition reports will not be reported on a regular basis until March. However, the U.S. drought monitor reports on soil conditions on a weekly basis. This data can be used to help predict yields especially in states like Kansas where soil moisture entering the growing season is often a limiting factor for yields. Because wheat harvest is still over 3 months away, readers are cautioned about reading too much into these results.

### Data

The model developed here follows a similar procedure that Ibendahl used to estimate crop yields based on the USDA crop conditions report. Instead of the growing conditions report, the Drought Severity and Coverage Index (DSCI) is used to estimate corn yields. The DSCI (Akyuz[3]) shares many similarities to the Crop Condition Index (CCI) (Bain and Fortenbery[4]). Where the CCIndex weights the best condition with the most points, the DSCI weights the worst condition with the most points.

The U.S. Drought Monitor labels droughts by the level of severity. There are 5 levels of drought ranging from D0 (least severe) to D4 (most severe). The DSCI is a computed by the formula:

```
    DSCI = (% acreage in D0) * 1    +
           (% acreage in D1) * 2    +
           (% acreage in D2) * 3    +
           (% acreage in D3) * 4    +
           (% acreage in D4) * 5
```

The index ranges from [0, 500]. An index value of 500 corresponds to 100 percent of the crop acreage in the most extreme drought (D4), and a value of 0 indicates 100 percent of the crop acreage is not in any drought state. The U.S. Drought Monitor computes these values for various sized areas including at the county level. The site has weekly data back to the year 2000.

## Model

The model used in this paper first computes the trend line yield on a crop reporting district basis from 2000 to 2023. Most CRDs have a small positive trend line increase in yields. Next, the deviation from trend line is calculated for each year. This deviation from trend is what the DSCI is used to estimate. Because NASS no longer reports CRD yields, Ibendahl generated the CRD yields by aggregating individual counties within a CRD.

Currently, the USDA has not reported country yields for 2024. Some county level reports from the USDA are being discontinued. If county level yields are not reported in the future, this model may have limited long-term use.

A linear regression model is used to estimate the deviation from trend for a specific week using the data from 2000 to 2023. There is a separate regression model for each CRD. The regression model is unique to a specific week. For this paper, the latest DSCI report for 2025 is week 7 (2/22/25). To estimate the linear model, the DSCI data is filtered to provide only the historical week 7 DSCI numbers and these are used as the independent variable to predict the final yield. Once the linear model is developed at the CRD level, the DSCI reading for 2025 and week 7 is plugged into the equation to estimate the deviation from trend for this year's CRD yield.

## Results

The CRD level results are shown in Table 1. The second column in each of the tables is the trend line yield. This is the expected yield for a CRD in a "normal" year. The next three columns are the predicted yields based on the linear model using the DSCI to predict the yield deviation for this year. The yield deviation from the linear model is subtracted from the trend yield to get the predicted yields shown. While the most likely yield column is the point estimate of the model, the upper and lower range values should not be ignored. At this point, there is a wide range of yields that could occur and the confidence interval reflects this uncertainty.

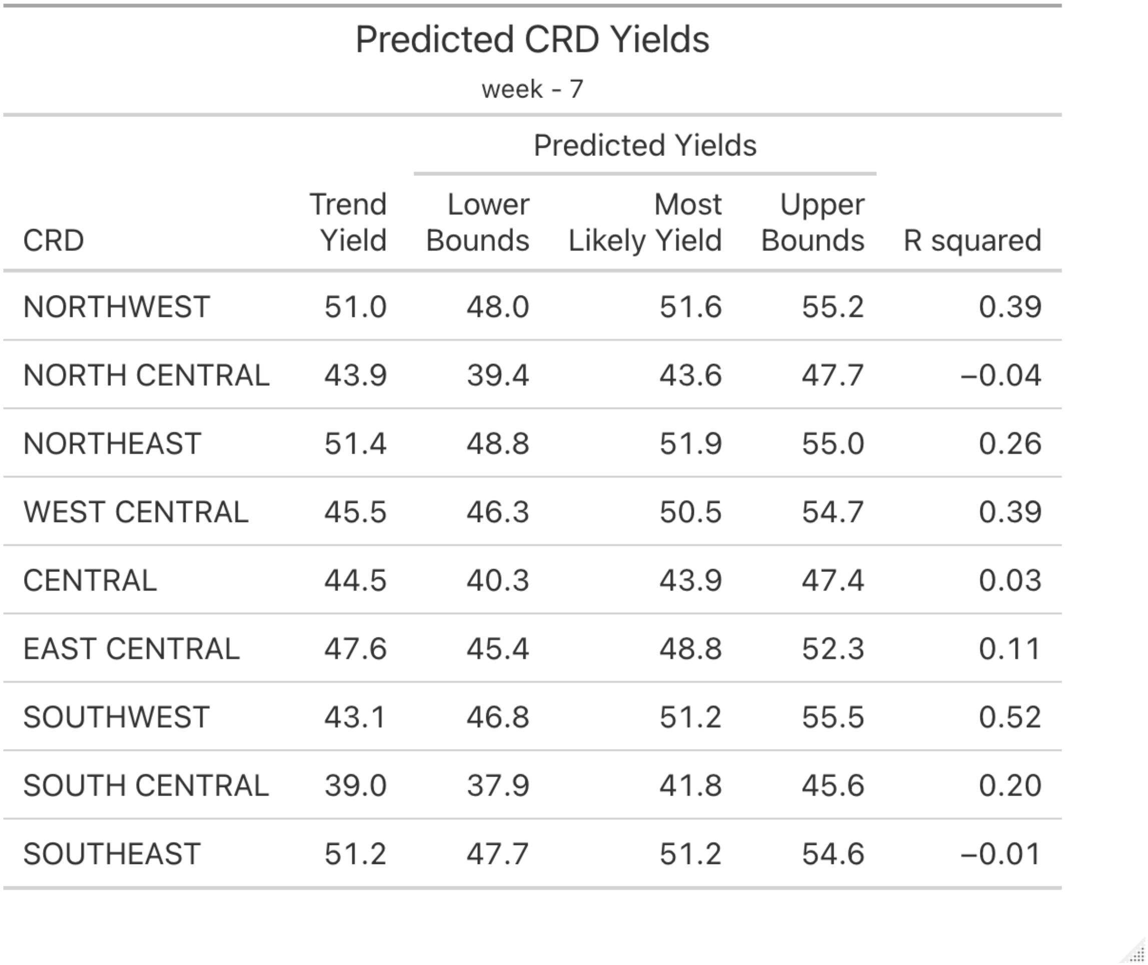
The final column is the r-squared value and it tells how well the linear regression model fits the yield data. Values can range from -1 to 1 with a 0 value indicating the model doesn't predict yields at all. As Figure 1 shows, there is a wide variation in how well CRD level data works. While some CRDs show the model has no explanatory power, there are other CRDs with a strong fit. Those CRDs with an r-squared value close to zero will show a predicted yield close to trend line in most cases. In these CRDs more attention should be focused on the possible yield range. Figure 2 shows the drought conditions for the current week back to 2000.

## Discussion

These yield predictions using the Drought Monitor data should be considered less reliable than the estimate using the NASS crop conditions. First, this model is still being developed and a better model may be found. Second, the drought monitor provides no information about the soil situation when there is a surplus of moisture. There is either no drought or various levels of drought in the Drought Monitor data. A better model to predict yields would likely have some information about surplus moisture. Still, developing a model using the DSCI index allows for a finer grained model than using the state moisture conditions from NASS. The Dought Monitor data is available at the CRD level and also at the county level.

It is also very early in the year. Many weather events (or lack of events) can still occur before harvest. At the present time, only the very western CRDs in the state show any model predictive power. Even these western areas have low r-squared values.

**Table 1. Kansas Crop Reporting Districts - Estimated Yields**



Predicted CRD Yields

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| CRD | Trend Yield | Predicted Yields Lower Bounds | Predicted Yields Most Likely Yield | Predicted Yields Upper Bounds | R squared |
|---|---|---|---|---|---|
| NORTHWEST | 51.0 | 48.0 | 51.6 | 55.2 | 0.39 |
| NORTH CENTRAL | 43.9 | 39.4 | 43.6 | 47.7 | –0.04 |
| NORTHEAST | 51.4 | 48.8 | 51.9 | 55.0 | 0.26 |
| WEST CENTRAL | 45.5 | 46.3 | 50.5 | 54.7 | 0.39 |
| CENTRAL | 44.5 | 40.3 | 43.9 | 47.4 | 0.03 |
| EAST CENTRAL | 47.6 | 45.4 | 48.8 | 52.3 | 0.11 |
| SOUTHWEST | 43.1 | 46.8 | 51.2 | 55.5 | 0.52 |
| SOUTH CENTRAL | 39.0 | 37.9 | 41.8 | 45.6 | 0.20 |
| SOUTHEAST | 51.2 | 47.7 | 51.2 | 54.6 | –0.01 |

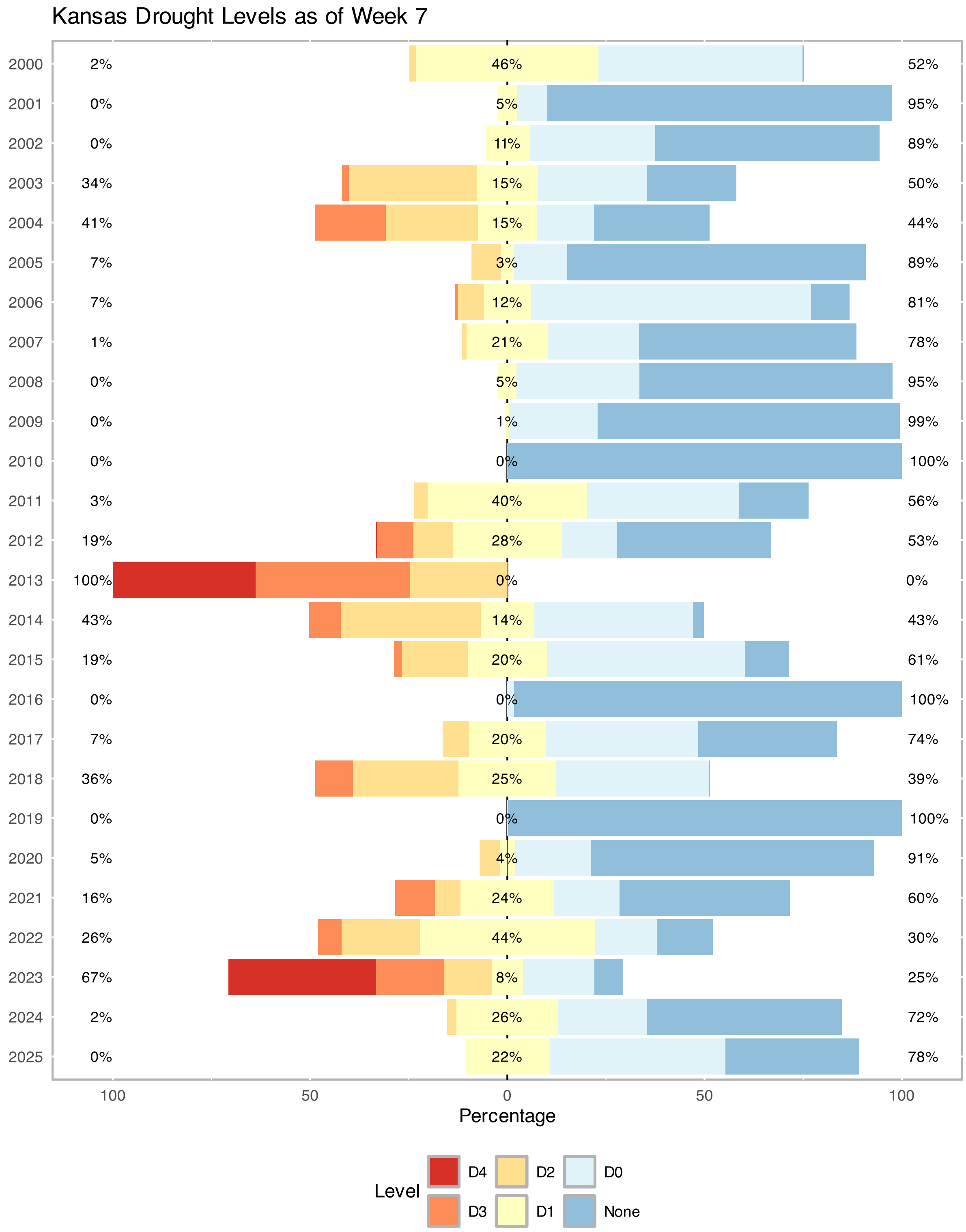

*Figure 1. Historical Drought Conditions in Kansas*

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   AgManager.info
   email: ibendahl@ksu.edu
   YouTube: https://www.youtube.com/\@little_pond_farm
   Substack: https://agricultural.substack.com
2. U.S. Drought Monitor. (https://droughtmonitor.unl.edu).
3. Akyuz, F. A. 2017. Drought Severity and Cover- age Index. United States Drought Monitor. https://droughtmonitor.unl.edu/About/AbouttheData/DSCI.aspx
4. Bain, R. and T. R. Fortenbery. 2013. "Impacts of Crop Conditions Reports on National and Local Wheat Markets." Proceedings of the NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. St. Louis, MO. (http://www.farmdoc.illinois.edu/nccc134)