

# Days Suitable for Field Work in Kansas by Crop Reporting Regions

Jeffery Williams and Richard Llewelyn

Department of Agricultural Economics, K-State Research and Extension

Manhattan, KS 66506

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Selecting the most profitable combination of crop enterprises is influenced by the number of field workdays available to prepare the seed bed, to plant, to spray and cultivate, and to harvest crops. Also, the least-cost size of equipment is affected by the number of days available for field work, in addition to the number of acres to be planted, tilled, sprayed, and harvested. When crop acreage is increased or crop mix changed, the farm manager must determine what machinery size best fits the crops and acreage to be farmed (Buller, 1992).

Limited field workdays during critical planting and harvesting periods necessitate productive labor use, which is affected by machinery size. Less productive use of labor, if possible, should be postponed until a rainy day or until after critical operation time periods. Decisions on how large a tractor, planter, sprayer, cultivator, or other pieces of machinery to buy are more complex than calculating the size necessary to minimize per-acre costs. To complete fieldwork including tillage, fertilization, spraying, and planting operations in some years with fewer days suitable for field work due to unfavorable weather conditions, larger machinery will be required than in a year with more favorable weather conditions and available field work-days. In other years, when rainfall interferes infrequently with completing spring field work, farmers have little difficulty scheduling field operations with average-sized equipment (Buller, 1992).

Because it is unreasonable to try to adjust equipment sizes from year-to-year, the number of field work-days by week with associated probabilities can be useful in determining equipment size. This publication reports the minimum number of field work-days available by week of the year for each of the nine crop reporting regions in Kansas with 25%, 50% and 75% probability of occurrence. Average days suitable for fieldwork by week of the year are also reported.

## Data and Procedures

To help Kansas farm managers plan machinery size for timely field work, the United States Department of Agriculture, National Agricultural Statistics Service's Kansas Field Office (USDA-NASS-KS FO) publishes reports weekly, on Monday, of the number of days suitable for field work (Crop Progress and Condition Report<sup>1</sup>). The information for these reports is provided by county extension offices and Farm Service Agency (FSA) offices in each of the nine crop reporting districts: northwest (NW), west central (WC), southwest (SW), north central (NC), central (C), south central (SC), northeast (NE), east central (EC), and southeast (SE), as shown in Figure 1. The reports are published from the first week in March through the first week in December. Days suitable for tillage and harvesting are reported (USDA-NASS-KS FO, 2013).

This study used the reports published from 1981 through 2012 to calculate the minimum number of days reported as suitable for field work that occur 25%, 50% and 75% of the time for each week during this period. In order to do this, data were needed in each of the 32 years. Because the data were not always available for every week in March and April, results are based on data available for the 17th week of the year (approximately the last week of April) through the 47th week of the year (approximately the third week of November). For ease of interpreting results, the week number begins with the first Saturday of January. Week 17 which is the first week with results reported is the data for the 17<sup>th</sup> week of the year that ends on a Saturday. This week ends as early as April 22 and as late as April 29 because the first day of each year and month varies across several years. Therefore the 18<sup>th</sup> week begins as early as April 29 or as late as May 6.

## Results

Table 1 shows the 1981 through 2012 average number of days suitable for field work for each

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<sup>1</sup> [http://www.nass.usda.gov/Publications/State\\_Crop\\_Progress\\_and\\_Condition/index1.asp](http://www.nass.usda.gov/Publications/State_Crop_Progress_and_Condition/index1.asp)

district for each week. The results are based on seven-day work weeks. Although averages are useful, the actual number of field work-days available each week varies considerably from year to year. Figures 2 through 10 show the minimum number of field work-days available 25%, 50% and 75% of the time by week for each district. In northwest Kansas (Figure 2) at least 3 days are available during the 17<sup>th</sup> week 75% of the time, or 24 years out of the 32 in the data. Further, at least 4.6 days are available 50% of the time, or 16 out of 32 years, and 6 days are available 25% of the time or 8 years out of 32. In northeast Kansas (Figure 8) at least 3 days are available during the 25<sup>th</sup> week 75% of the time, or 24 years out of the 32 years in the data. Week 25 ends as early as June 17 and as late as June 24. Further, at least 4.5 days are available 50% of the time and 5.7 days are available 25% of the time.

#### **Days Available for Field Work Effect on Equipment Selection: Equations and Example**

The number of days suitable for field work can be used to determine equipment size using the following equations (Schrock, 1976). Typical speed and field efficiency of farm equipment are reported in Table 4 of Kastens (1997) and Hanna (2001). Field efficiency accounts for time spent positioning, turning the equipment, fueling, filling seed boxes, and adjusting equipment.

$$\text{Field Workdays} \times \text{Hours/Day} = \text{Total Time Available (Hours)}$$

$$\frac{\text{Total Acres}}{\text{Total Time Available (Hours)}} = \text{Acres/Hour}$$

$$\frac{\text{Acres/Hour} \times 8.25}{\text{Speed(MPH)} \times \text{Field Efficiency (\%)}} = \text{Estimated Equipment Width (Feet)}$$

An example for a no-till planter used on 640 acres over the last two weeks of May (weeks 21 and 22) for north central Kansas using the average days available from Table 1, with 12 operator working hours/day, a speed of 5.5 miles/hour, and a field efficiency of 0.60 is shown below:

$$7.7 \text{ Days (Table 1)} \times 12 \text{ Hours/Day} = 92.4 \text{ Hours}$$

$$\frac{640 \text{ Acres}}{92.4 \text{ Hours}} = 6.93 \text{ Acres/Hour}$$

$$\frac{6.93 \text{ Acres/Hour} \times 8.25}{5.5 \text{ MPH} \times 0.60} = \text{Estimated Equipment Width of 17.31 Feet}$$

Therefore, an actual available planter width of 20 feet (an 8-row planter with 30-inch row spacing) and appropriate tractor size would be needed to plant the 640 acres, using the average available days and 12-hour days.

In order to ensure being able to complete the work in 75% of the years during the last two weeks of May, the average available field workdays is only 5.2 (2.2 for week 21 and 3.0 for week 22 from Figure 5). Substituting 5.2 days for the 7.7 days used previously results in 62.4 hours rather than 92.4 hours and an estimated minimum planter size of 25.6 feet which would generally require an actual planter width of 30 feet (a 12-row planter with 30-inch row spacing).

To ensure a high probability the field operation is completed on time, larger equipment may be needed, as in the previous example. Not being able to complete the field operation in a timely manner may lead to lower productivity. However, the decision on the size of equipment to use is based upon a number of factors including field workdays as demonstrated here but also available labor, the manager's ability to handle risk, and operator preference.

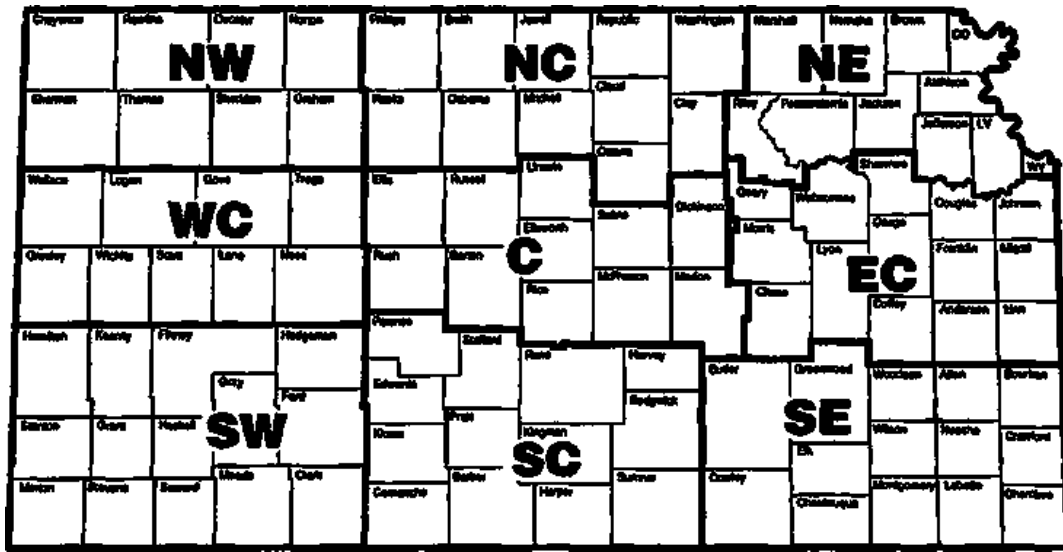
An alternative approach developed by the University of Missouri Food and Agricultural Policy Research Institute (FAPRI) uses a spreadsheet tool with Missouri data to determine the probability of completing, or not completing, field-work given existing machinery capacity (Carpenter, Gerit, and Massey, 2012).

### Summary

Field workdays are reported weekly each year from March to November for each crop recording district in Kansas. This paper uses 32 years of data, from 1981-2012, to provide average field

workdays available for each week, as well as minimum number of field work-days available 25%, 50% and 75% of the time by week. An important application of this information is for determining appropriate equipment size needed for a farm operation. An example showing the required calculations for determining a planter size is included.

Figure 1. Nine Crop Reporting Districts of Kansas



**Table 1. Number of Days Suitable for Field Work by Crop Reporting District and Week (1981-2012 average).**

Week Ending		Week No.	Crop Reporting District									
Earliest	Latest		NW	WC	SW	NC	C	SC	NE	EC	SE	
22-Apr	29-Apr	<b>17</b>	4.3	4.5	5.4	4.1	4.1	4.8	3.7	4.0	4.0	
29-Apr	6-May	<b>18</b>	4.1	4.3	4.9	3.7	3.9	4.3	3.3	3.3	3.1	
6-May	13-May	<b>19</b>	4.3	4.5	5.2	3.9	3.8	4.5	3.5	3.4	3.3	
13-May	20-May	<b>20</b>	5.0	5.0	5.5	4.2	4.1	4.9	3.8	3.8	3.4	
20-May	27-May	<b>21</b>	4.6	4.9	5.4	4.0	4.3	4.7	4.0	3.7	3.6	
27-May	3-Jun	<b>22</b>	3.7	4.1	4.8	3.7	3.2	4.0	3.4	3.6	3.7	
3-Jun	10-Jun	<b>23</b>	4.1	4.3	4.8	4.1	3.7	3.9	3.9	3.6	3.5	
10-Jun	17-Jun	<b>24</b>	4.7	4.7	5.1	4.4	4.3	4.6	4.1	3.7	3.8	
17-Jun	24-Jun	<b>25</b>	5.2	5.3	5.3	4.9	4.7	5.0	4.3	4.3	4.6	
24-Jun	1-Jul	<b>26</b>	5.5	5.3	5.4	5.0	4.8	5.1	4.6	4.7	4.9	
1-Jul	8-Jul	<b>27</b>	5.3	5.6	5.6	5.0	5.0	5.2	4.8	4.8	4.9	
8-Jul	15-Jul	<b>28</b>	5.4	5.5	6.0	5.0	5.2	5.5	5.0	5.0	5.1	
15-Jul	22-Jul	<b>29</b>	5.5	5.7	6.2	5.3	5.7	5.9	5.5	5.7	5.9	
22-Jul	29-Jul	<b>30</b>	5.3	5.2	5.7	5.2	5.1	5.6	5.4	5.4	5.5	
29-Jul	5-Aug	<b>31</b>	5.2	5.2	5.7	4.9	5.1	5.5	5.2	5.3	5.7	
5-Aug	12-Aug	<b>32</b>	5.3	5.1	5.5	5.1	5.2	5.7	5.5	5.5	5.9	
12-Aug	19-Aug	<b>33</b>	5.3	5.1	5.3	4.9	4.9	5.4	5.0	5.1	5.7	
19-Aug	26-Aug	<b>34</b>	5.5	5.3	5.7	5.1	5.0	5.4	5.1	5.2	5.4	
26-Aug	2-Sep	<b>35</b>	5.5	5.6	5.9	5.1	5.1	5.5	4.9	5.3	5.6	
2-Sep	9-Sep	<b>36</b>	5.9	5.9	6.1	5.6	5.5	5.8	5.2	5.4	5.7	
9-Sep	16-Sep	<b>37</b>	5.6	5.7	5.7	5.1	5.2	5.6	5.3	5.4	5.5	
16-Sep	23-Sep	<b>38</b>	5.5	5.4	5.7	5.0	4.8	5.3	4.7	4.9	4.8	
23-Sep	30-Sep	<b>39</b>	5.7	5.6	6.0	5.0	5.1	5.6	4.7	5.0	5.2	
30-Sep	7-Oct	<b>40</b>	6.0	6.0	6.0	5.4	5.4	5.5	5.1	5.1	5.2	
7-Oct	14-Oct	<b>41</b>	5.3	5.4	5.8	5.0	4.9	5.0	4.9	4.9	5.0	
14-Oct	21-Oct	<b>42</b>	5.2	5.3	5.6	4.8	4.7	5.2	4.6	4.9	4.8	
21-Oct	28-Oct	<b>43</b>	5.0	5.1	5.4	4.9	4.9	5.1	4.6	4.6	4.6	
28-Oct	4-Nov	<b>44</b>	5.3	5.4	5.4	4.9	4.8	5.2	4.5	4.3	4.2	
4-Nov	11-Nov	<b>45</b>	5.1	5.1	5.4	4.7	4.8	4.9	4.2	4.1	4.1	
11-Nov	18-Nov	<b>46</b>	5.0	5.1	5.5	4.9	4.8	5.0	4.4	4.3	4.3	
18-Nov	25-Nov	<b>47</b>	5.0	4.9	5.5	4.8	4.9	5.2	4.4	4.2	4.0	



Figure 2. Number of Days Suitable for Field Work, Northwest Kansas

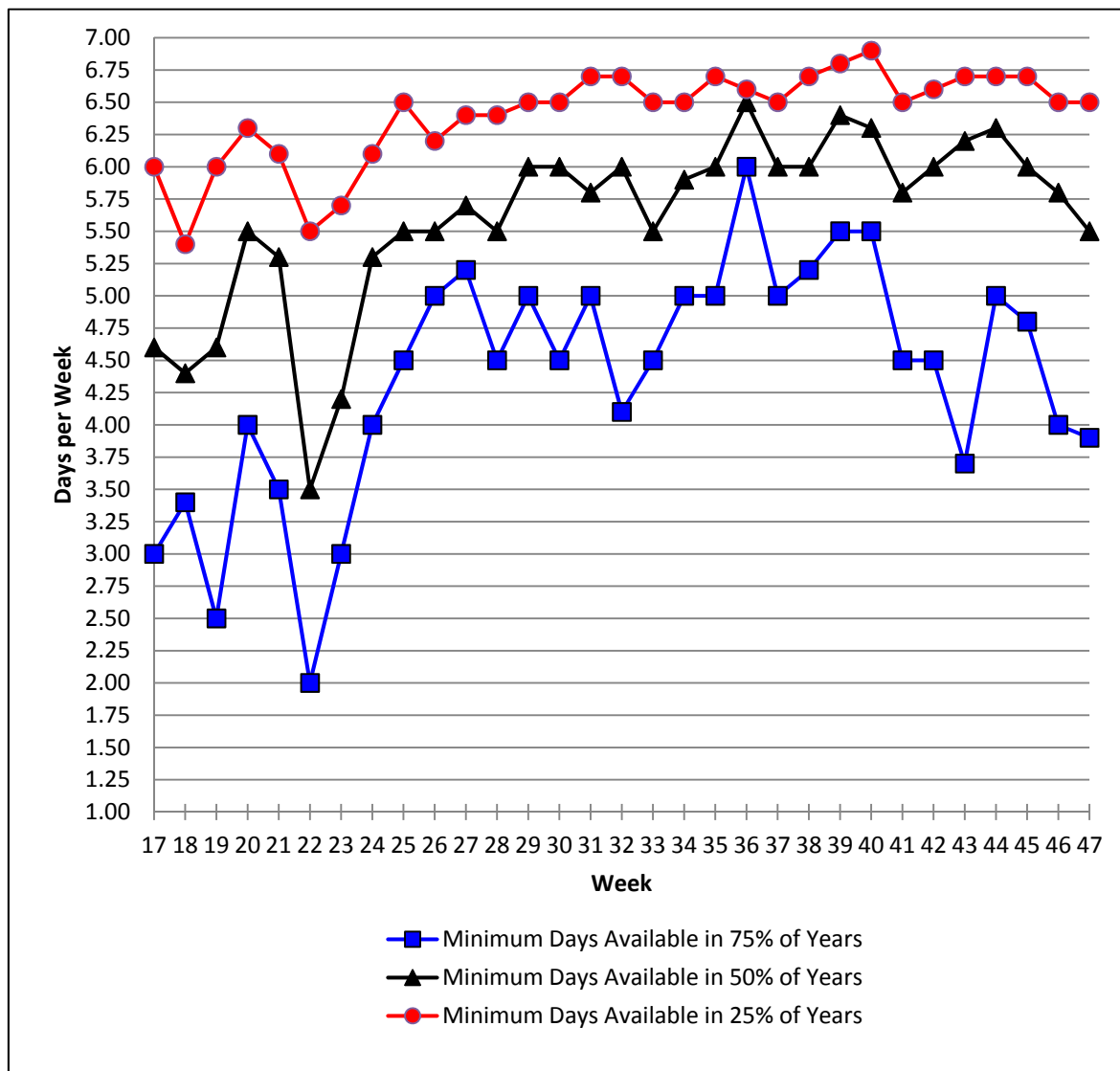


Figure 3. Number of Days Suitable for Field Work, West Central Kansas

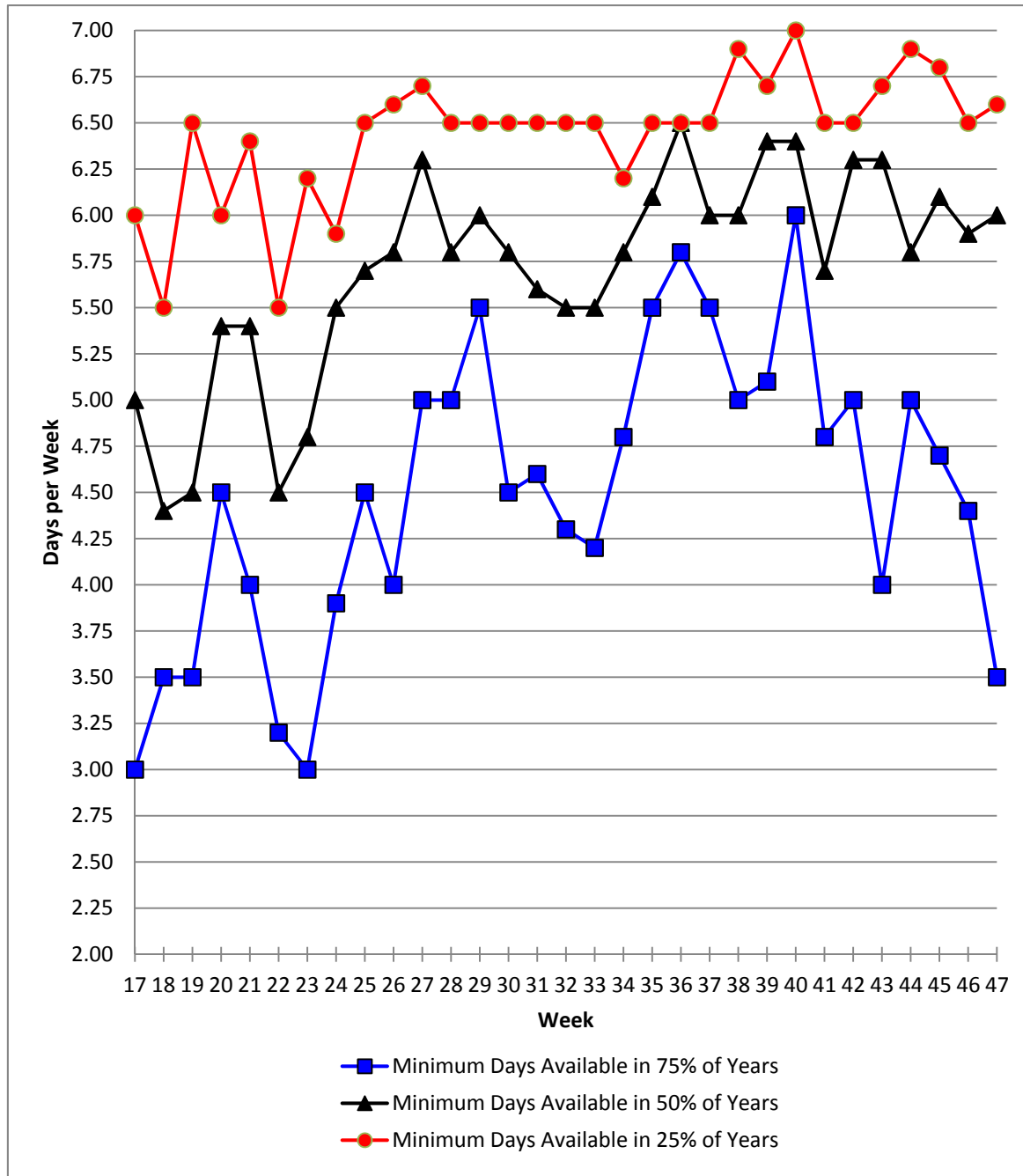
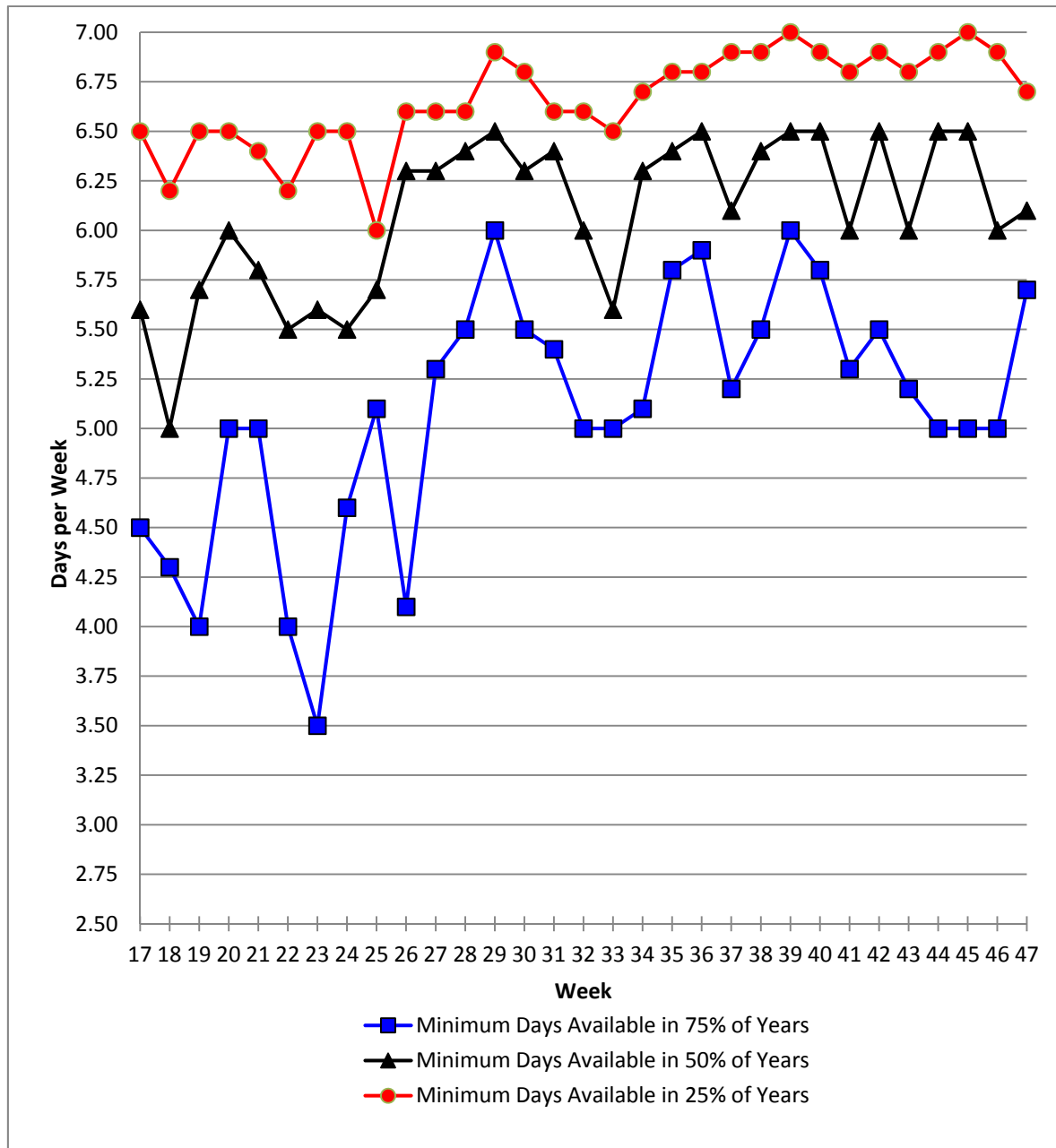
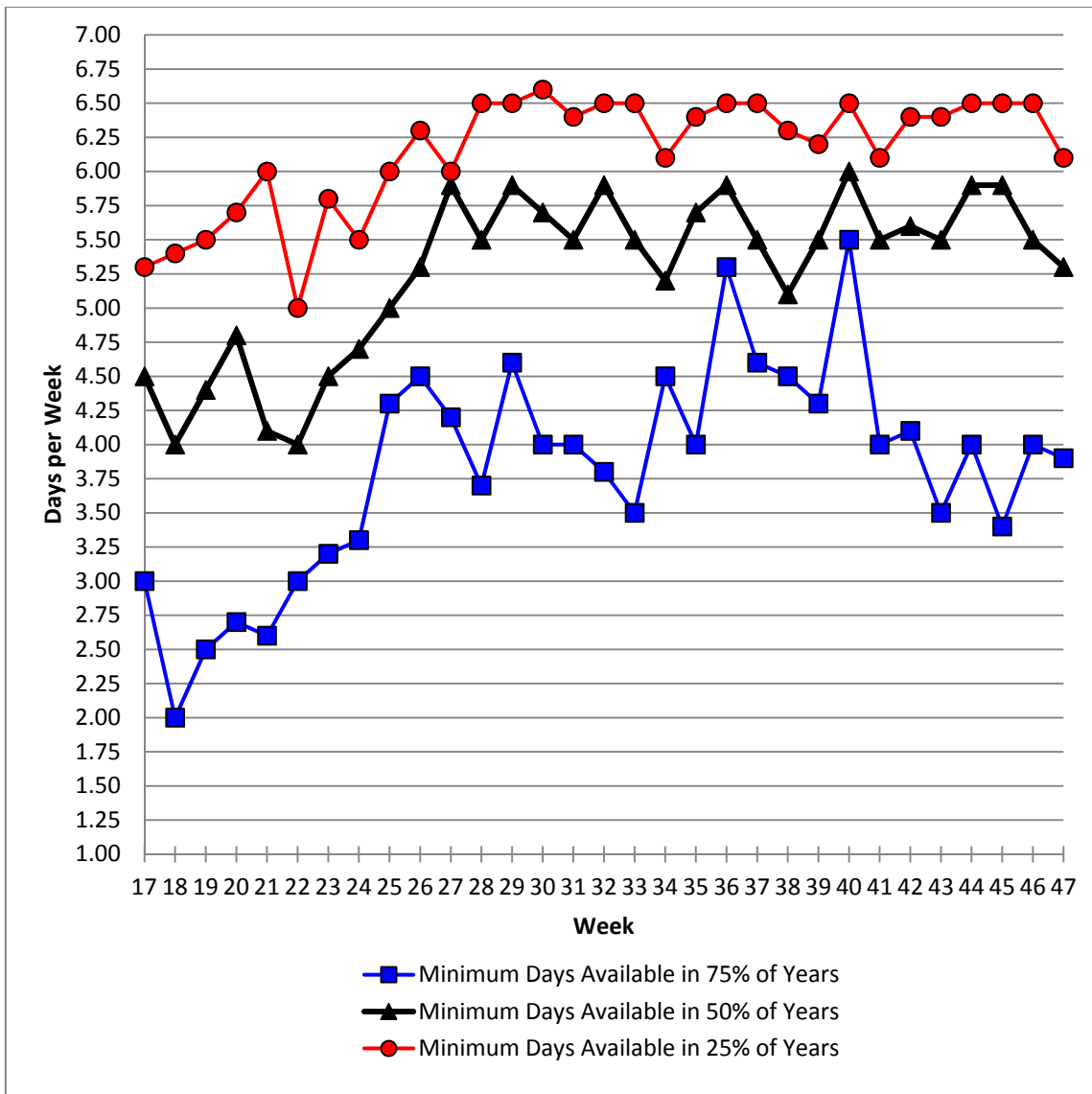


Figure 4. Number of Days Suitable for Fieldwork, Southwest Kansas



**Figure 5. Number of Days Suitable for Field Work, North Central Kansas**



**Figure 6. Number of Days Suitable for Field Work, Central Kansas**

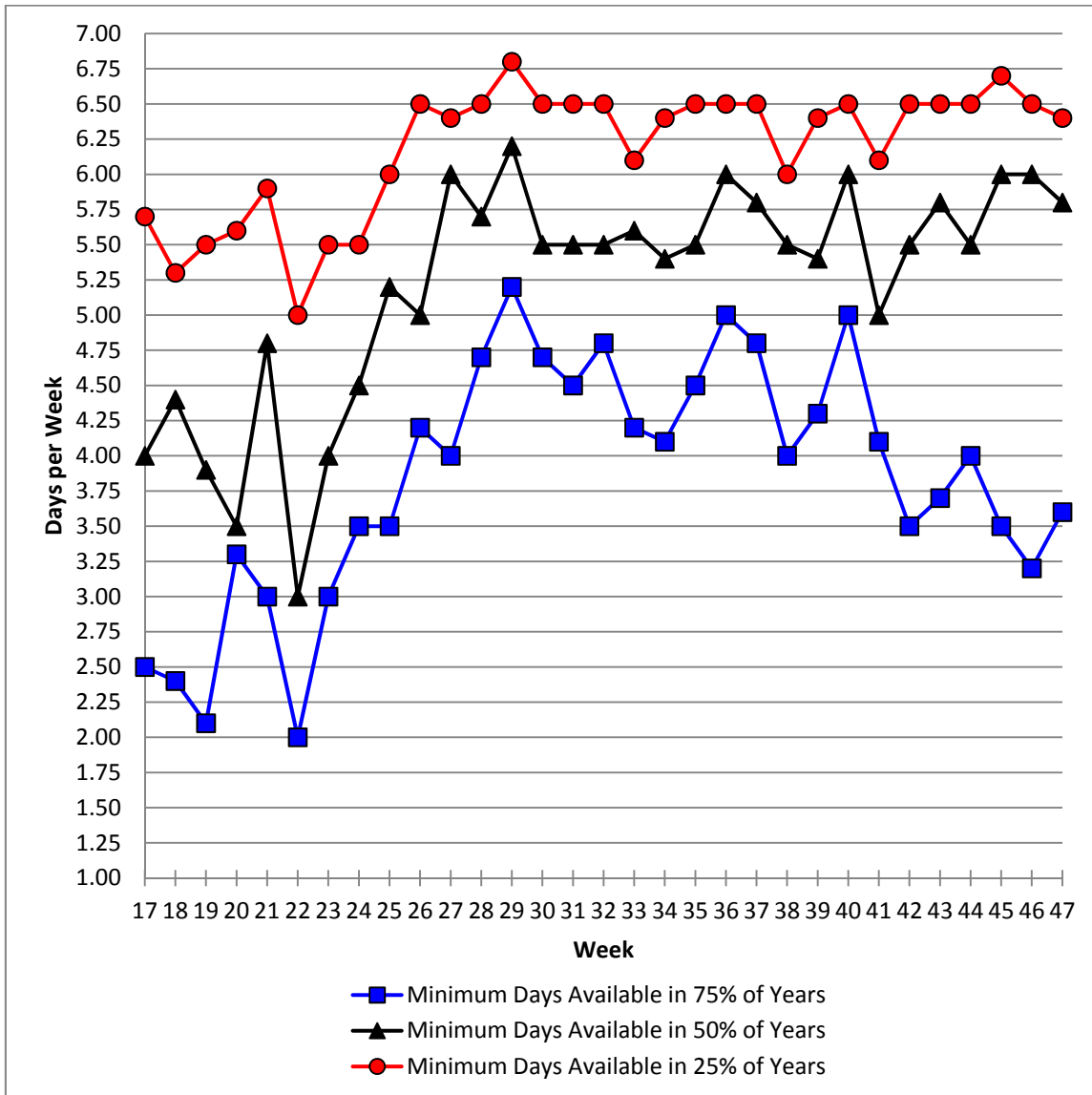
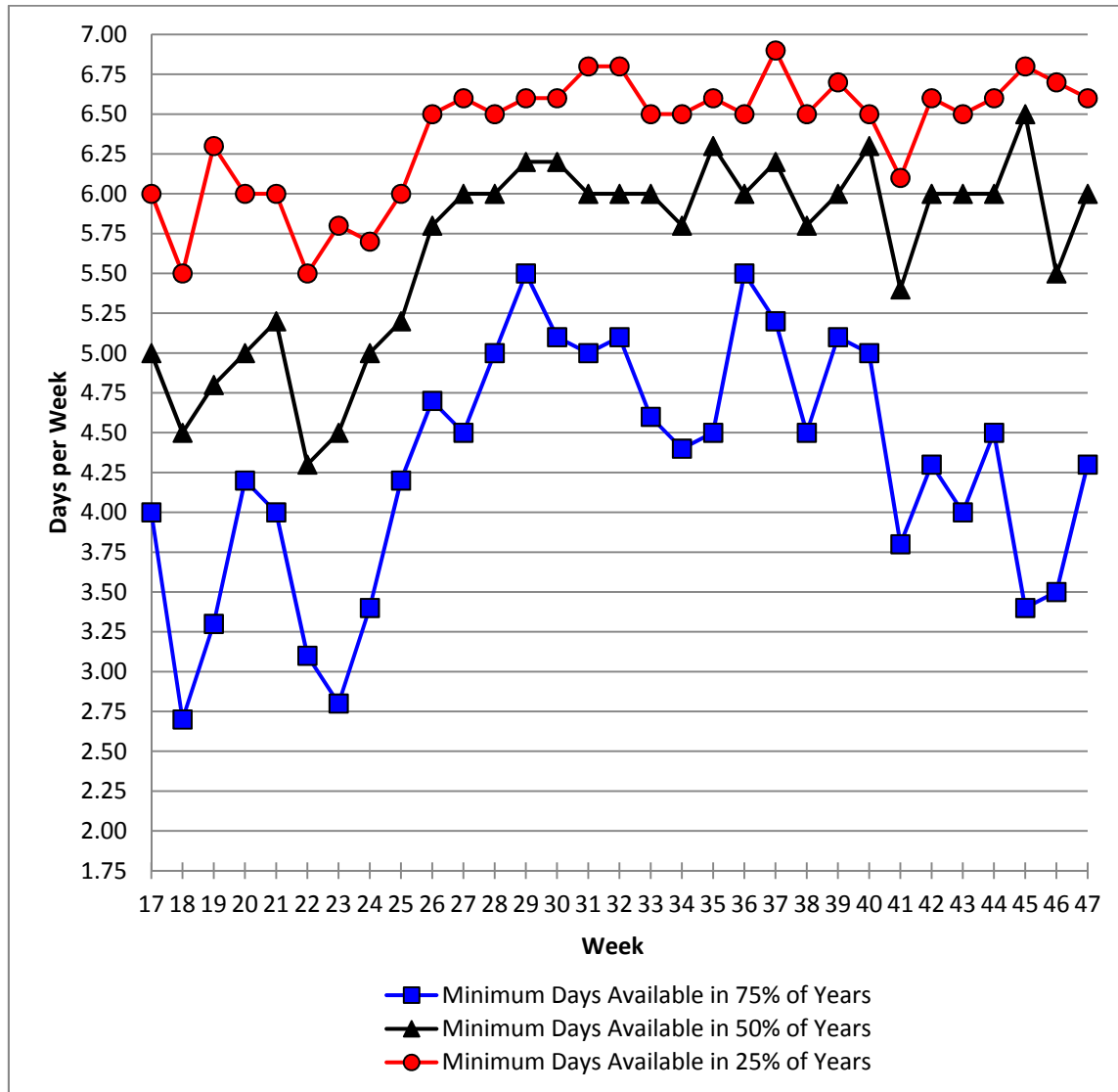


Figure 7. Number of Days Suitable for Field Work, South Central Kansas



**Figure 8. Number of Days Suitable for Field Work, Northeast Kansas**

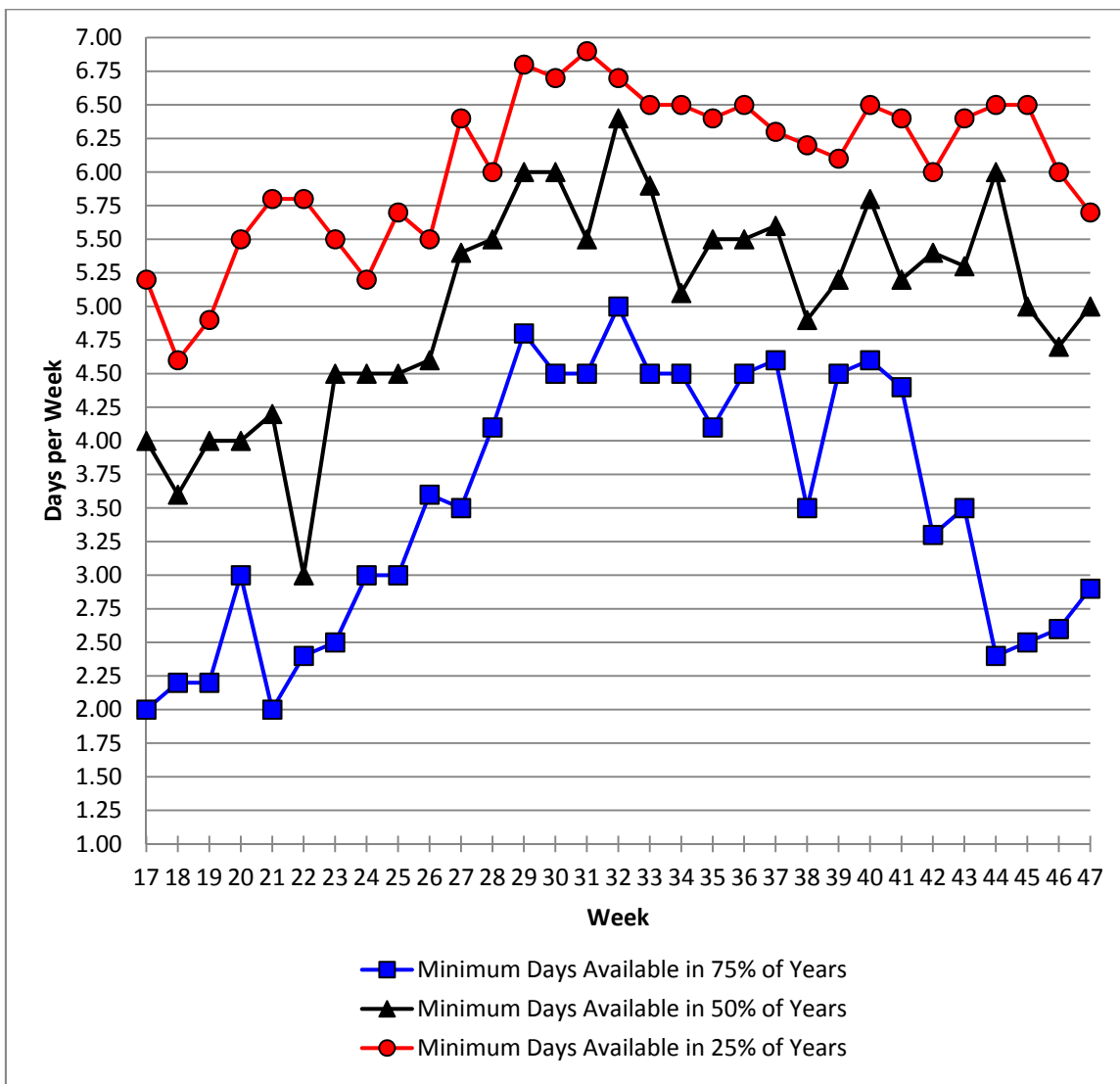
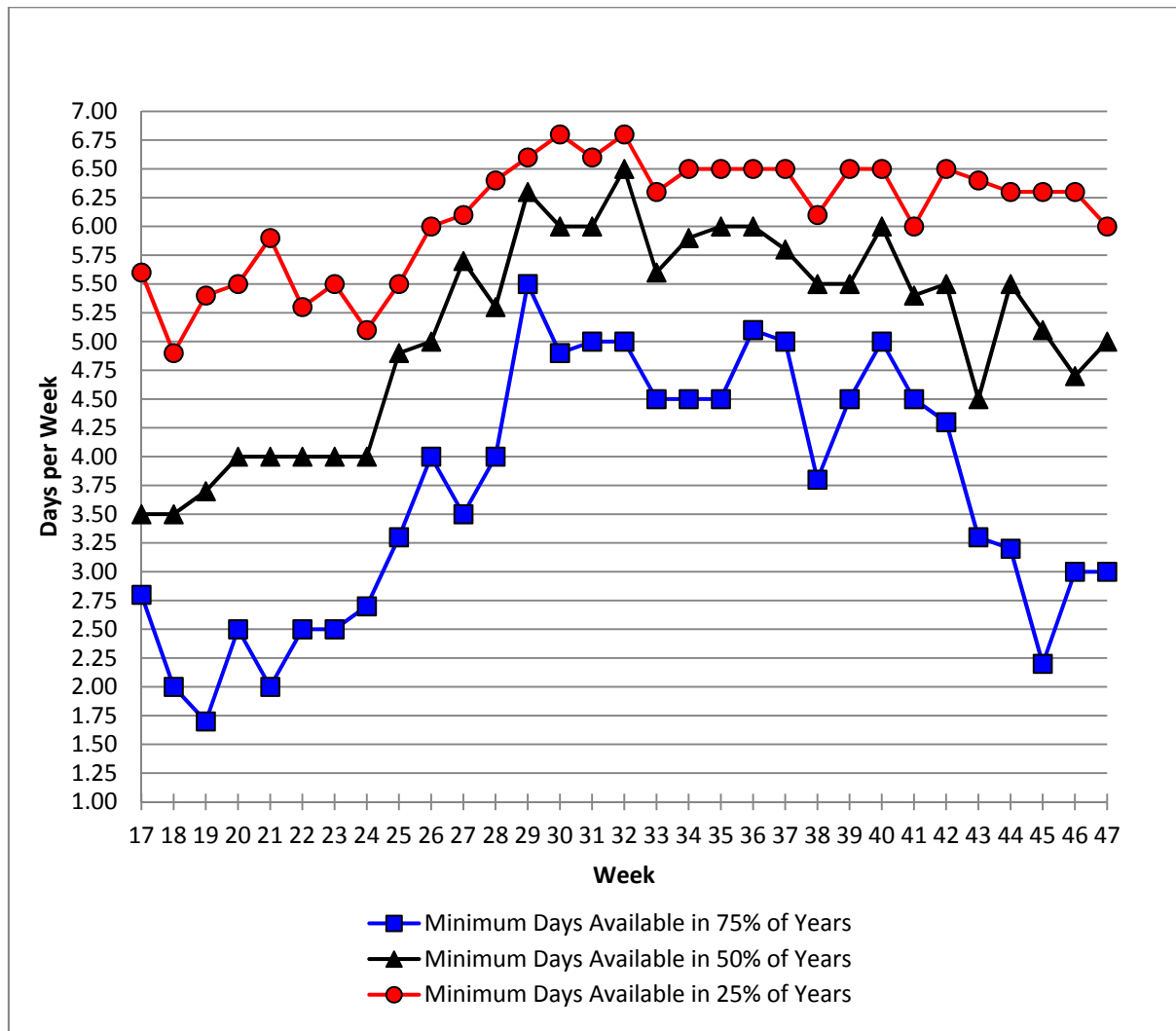
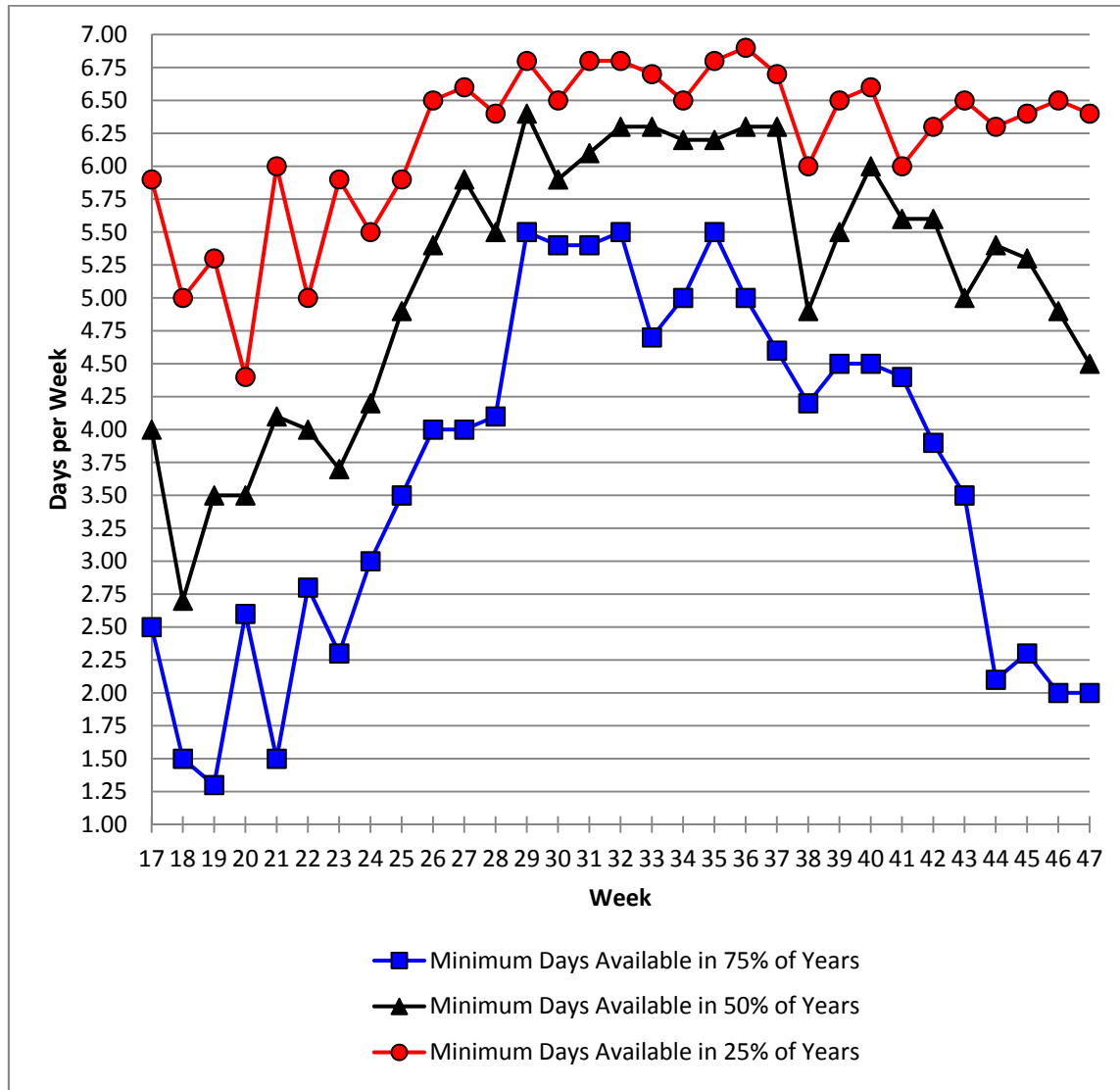


Figure 9. Number of Days Suitable for Field Work, East Central Kansas





**Figure 10. Number of Days Suitable for Field Work, Southeast Kansas**



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