WHEAT OUTLOOK: JULY 2023

SUMMARY
At present, this early in the winter crop growing season, starting soil water conditions and the seasonal rainfall outlook indicate that chances are for a close to average wheat yield (-5% deviation from long-term median) during the 2023 wheat-growing season at an aggregated state (QLD) level. However, some variation in predicted yield outcomes exist within the state’s cropping region. Specifically, while most parts of QLD have increased chances for a below average wheat yield crop, some parts of SEQ has a chance similar to climatology (40% to 60%) or slightly increase chance (60% to 70%) of this year’s wheat crop being above the long-term median for that region. This early in the season, widespread above average rainfall is needed across all parts of the state’s cropping region during July. This is needed to induce good planting opportunities for some late sowings and improve current winter cropping conditions across the state. However, the likely range of yield outcomes is wide. This range will narrow over the next few months as the outlook is updated through the season. All climate indicators for ENSO are in an EL Niño ALERT mode.

GENERAL CONDITIONS
Below to very much below average rainfall was recorded during June 2023 for most parts of Queensland’s winter cropping region. Furthermore, rainfall recorded during the three months from April 2023 to end of June 2023, was below to very much below average across almost the entire state’s cropping region. This resulted in few sowing opportunities for winter cropping. The exception was for some parts of SEQ that received average rainfall for that period. This has resulted in available soil water levels recharged to above 70% of the potential available water content (Map 2 showing the simulated PAWC using APSIM). The recent climate outlook at the end of June suggests a high chance of unusually low rainfall for the period July to September (http://www.bom.gov.au/climate/outlooks/#/rainfall/median/seasonal/1). Crops sown into profiles with low soil water are more dependent on in-crop rainfall. At this early stage, almost all atmospheric indicators for ENSO are in an EL Niño ALERT mode. Progress of these ENSO indicators can be followed here (www.bom.gov.au/climate/enso).

OUTLOOK
The benchmark for this outlook is the simulated long-term median shire wheat yield within the QLD cropping region (Map 1). The median yield is based on predicted performance over the past 122 years using an agro-climatic model for wheat with long-term rainfall records (see descriptive note for more details). The probability of exceeding the long-term median shire wheat yield for the coming season is shown in Map 3. Any areas coloured in yellow to red have a reduced chance of exceeding the median yield, whereas areas coloured in green to blue have an increased chance. Maps 3 was derived by considering conditions up to the end of June 2023 and projecting forward based on climate ensembles generated from ACCESS-S2 (see details for references). The calculation of benchmark yields, and outlook chances do not take into account effects of poor crop nutrition or damage due to pests, diseases, frosts, or extreme events (e.g., heat waves).

Map 1: Simulated long-term median shire yield derived from 1901 to 2022 using 2023 technology.

Map 2: Aggregated soil water recharge status (%) as at 1st July 2023. Short summer fallow simulated from 1st of October 2022.
This outlook is derived assuming only a summer (short) fallow period. The current state wheat outlook, at this very early stage in the season, across most of the state’s cropping area are for a reduced chance of exceeding the long-term median yield. Specifically, at a regional level, most of CQ have a reduced chance (10%) of exceeding the long-term median yield. While, some parts of SWQ has chances similar to climatology (50:50) of exceeding the long-term median. The exception is for some parts of SEQ that has a slightly increased chance (60% to 70%) of exceeding the long-term shire yield expectation. Widespread average rainfall during July is needed to induce plantings and improve the current wheat yield outlook for most of the state’s winter cropping region. Note: It should be noted that at this stage of the season, there is a wide range of likely yield outcomes for the 2023 season (see State Outlook section) as all the growing season remains in the projected forecast. The current seasonal climate forecast skill will improve towards the end of August. Updating of actual climate and thus shortening of the forecast period will cause the range of yield outcomes to narrow towards the final realised yield at the end of the season.

**Poor Crop Chance**

At present, this early in the growing season, some parts of CQ have a moderately increased chance (i.e., 10% to 20%) for predicted wheat yield being in the worst 10% yield of all years (data not shown). It should be noted that these values are calculated as broad indicators for shire scale. They do not apply to farm level.

**REGIONAL OUTLOOK**

At present, this early in the season, the current state wheat outlook shows a forecast median yield at the start of July of 1.85 t/ha, which is slightly below the long-term median of 1.95 t/ha (Graph A). There is however, a 10% chance that the state yield could be lower than 1.77 t/ha or higher than 1.96 t/ha. However, keep in mind that it is early in the growing season and that widespread above average rainfall during the next 3-months is needed to improve the outlook at shire and regional scales.

At regional level, Southwest Qld (SWQ), Southeast Qld (SEQ) and Central Qld (CQ) (see Map 1), the forecast yield (t/ha) ranges are as follows:

<table>
<thead>
<tr>
<th>Region</th>
<th>Worst 10%</th>
<th>Median (50%)</th>
<th>Best 10%</th>
<th>Lt median</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWQ</td>
<td>1.48</td>
<td>1.66</td>
<td>1.94</td>
<td>1.70</td>
</tr>
<tr>
<td>SEQ</td>
<td>2.35</td>
<td>2.49</td>
<td>2.63</td>
<td>2.45</td>
</tr>
<tr>
<td>CQ</td>
<td>1.36</td>
<td>1.49</td>
<td>1.58</td>
<td>1.76</td>
</tr>
</tbody>
</table>

*Lt Median: long-term median.

Although there is a reduced chance of the current winter crop yielding above the long-term median, the crop yield forecast medians in SEQ (+2%) and CQ (-2%) are close to their long-term medians. The exception is for CQ, which has a forecast median that is around 15% below the long-term median.

**Disclaimer:** Crop industry forecast, and outlook reports are based on data collated by researchers at The University of Queensland and should only be used as a guide when making business decisions.

**DESCRIPTIVE NOTE:**

The seasonal wheat outlook is based on the integration of (i) a simple agro-climatic wheat stress index model (Oz-Wheat MII) (i.e. Bare fallow routine - Ritchie, 1972, Wheat stress index model adapted from - Fitzpatrick and Nix, 1969; Nix and Fitzpatrick, 1969), which is sensitive to water deficit or excess during the growing season, (ii) actual climate data up to the forecasting date and (iii) projected climate data after that date. These projected data are drawn from daily climate ensembles generated by ACCESS-S (http://www.bom.gov.au/climate/outputs/#/rainfall/summary) and downscaled (Schepen et. al., 2020a - doi.org/10.1002/joc.6346; 2020b - doi.org/10.1016/j.agrformet.2020.107991) for every long-term climatic station and crop producing shire. The Oz-Wheat model is run from 1 October the year before sowing to account for the influence of the summer fallow on starting soil moisture conditions. The model input parameters for each shire (i.e., potential available water content, planting rain & stress index period) have been selected based on the best fit when calibrated against actual shire wheat yields from the Australian Bureau of Statistics (ABS) for the period 1976 – 2000, 2005, 2010 & 2015 (MII). Cross validated spatial correlation when predicting the shire wheat yields for the 2000 season (MI) was 0.8 across all main wheat producing shires in Australia (Potgieter et. al., 2006). For the updated MII 75% of the 237 shires have $R^2 > 0.60$. 

**Map 3:** Probability of exceeding the long-term simulated median shire wheat yield (122 years).

**Graph A:** State level yield forecast trajectories (10th, 50th and 90th percentiles).