Carnarvon irrigation district water availability outlook – November 2016

Summary

The average annual water demand for Carnarvon irrigated horticulture over the last 10 years is 10.7 GL/year. The predicted supply for 2017 is 12.3 GL.

If no river flows occur in 2017, groundwater availability is adequate to meet the projected demand for that year. By early 2017, Subarea A users will have diminished supplies and the bulk of growers’ water will be sourced from the scheme. Low aquifer storage (LAS) will be in place during 2017 and 2018 until a river flow is received into Subarea A. Under LAS additional water will be released from the scheme borefields to meet increased demand in accordance with the Lower Gascoyne water allocation plan (2011).

Based on historical flow data, there is a 91% probability of having a significant river flow before 2019. However, if there is no river flow into 2019 and 2020, water availability may be constrained and irrigation shares may need to decrease. If there are no flows by 2019 and the Gascoyne Food Bowl Initiative lands are not fully developed, the new northern borefield could supplement supply to offset share decreases for existing growers.

The five-year seasonal forecast is summarised in the Table 1.

Table 1
Predicted water availability for a five-year no-flow period

<table>
<thead>
<tr>
<th>Year</th>
<th>Subarea A (GL)</th>
<th>Subarea B–L predicted seasonal share announcement (GWC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>3.1</td>
<td>100%</td>
</tr>
<tr>
<td>2018</td>
<td>2.0</td>
<td>100%</td>
</tr>
<tr>
<td>2019</td>
<td>1.5</td>
<td>80-100%</td>
</tr>
<tr>
<td>2020</td>
<td>1.3</td>
<td>60-80%</td>
</tr>
<tr>
<td>2021</td>
<td>1.0</td>
<td>60-80%</td>
</tr>
</tbody>
</table>
Background

The Carnarvon Ministerial Advisory Committee final report submitted to the Ministers for Water and Agriculture and Food recommended that “medium term outlooks are generated annually to inform growers and water service providers on current, short term and medium term water availability”. The development of the Carnarvon irrigation district water availability outlook - November 2016, was guided by the Borefield Managers Group. This group is made up of representatives from the Water Corporation, Department of Water, Gascoyne Water Cooperative, Gascoyne Water Asset Mutual Cooperative, Department of Agriculture and Food and Carnarvon Growers Association.

The Lower Gascoyne water allocation plan (2011) outlines the available allocations and surety of supply under different seasonal conditions. An extensive history of monitoring and hydrogeological information was used to develop the projections and provide surety of supply. Projections tend to be accurate for one-to-two years, while projections beyond two years have a higher level of uncertainty.

Forward projections

Water availability

The October 2016 Aquifer status report identified that depletion of the river bed sands is starting to occur. Groundwater availability is still high in the Older Alluvium aquifer, as a result of the effective recharge in 2015. This Older Alluvium supply provides a high level of confidence that even without a flow occurring in 2017, supplies from the borefields will be maintained throughout the year.

During 2017 there will be diminished supplies from Subarea A, requiring low aquifer storage to be in place until either a flow occurs, or until the existing borefields cannot sustain high levels of abstraction, which is not expected until 2019.

Should there be no river flow into 2019 and beyond, water availability may become constrained and irrigation shares may need to decrease to reflect the amount of water available. However, if the Gascoyne Food Bowl Initiative lands are not yet fully developed, the new borefield could be used to avoid, or reduce, seasonal reductions in shares. The supply availability (Figure 1) shows the worst case scenario of availability into the future, without the Gascoyne Food Bowl bores contributing to supply.
Annual demand

Over the last 10 years the average historical irrigation demand was 10.7 GL/year (see Figure 1). The predicted availability of supply for 2017 is 12.3 GL. If plantings are carried out as estimated, demand for the 2017 year is likely to be between 11 and 12 GL, so at the district scale the 2017 supply is greater than the forecast demand.

Peak irrigation demand period (September–December)

If there is no river flow in 2017, there will be an increased reliance on the irrigation scheme, particularly during the latter half of the year, resulting in elevated demand over the peak irrigation season. From October to November 2017 scheme demand will be at its highest with approximately 0.9 GL per month or 30 ML per day needed. As a result the balance of production from the northern and southern borefields will be carefully managed throughout the year to ensure capacity to meet peak season demand in late 2017. By 31 August 2017 the Borefield Managers Group will produce the annual peak demand response plan to consider any supply and demand issues during the peak period.

*Projected supplies for 2017–2020 doesn’t include the Gascoyne Food Bowl Initiative borefield.

Figure 1  Usage history and projected availability for 2017–2021*
Gascoyne Food Bowl Initiative

The Gascoyne Food Bowl Initiative aims to increase horticultural production through developing an additional 400 hectares, matched with a 4 GL/year water supply.

Land releases are expected to commence in 2017, but we assume that no significant volumes of water for this land will be required during 2017. Demand for Gascoyne Food Bowl Initiative water may start in 2018 and slowly increase to full production by 2020. However, this schedule depends on a range of factors and is difficult to predict. As a result, if an extended no-flow period occurs, the unused water from the new northern borefield could be temporarily used to supplement existing growers. Conversely, if the new lands are in full production by 2020, they would be subject to whole of industry changes in seasonal allocations. This issue will be considered in further detail in next year’s water availability outlook.

Probability of an extended drought period

Based on available records the Gascoyne River has a high flow reliability. The time between significant flows was more than three years only on two occasions, one hundred years apart. Table 2 below shows that while there is a moderate chance (30%) of not having a flow next year, the probability of no river flows by 2019 is low. Based on the available data there is a 91% probability of having a significant flow before 2019, when reductions in irrigation shares could be required.

Table 2
Probability of extended no flow periods

<table>
<thead>
<tr>
<th>Year</th>
<th>Years since river flow event</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>2</td>
<td>30%</td>
</tr>
<tr>
<td>2018</td>
<td>3</td>
<td>9%</td>
</tr>
<tr>
<td>2019</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>2020</td>
<td>5</td>
<td>0.8%</td>
</tr>
<tr>
<td>2021</td>
<td>6</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

Conclusions

- 100% Gascoyne Water Cooperative shares are recommended for 2017, and this should be maintained through 2018.
- During 2017 Subarea A supply will further diminish.
- Low aquifer storage response will be in place during 2017 and 2018, or until a flow occurs.
- Provision of Low aquifer storage water will allow the district water budget to be maintained above the historical average until at least the end of 2018.
- The probability of having three years of no river flows to trigger a reduction in allocations in 2019 is 9%.