



Katherine Water Plan Update

November 2019

This is the first update associated with the Katherine Tindall Limestone Aquifer Water Allocation Plan 2019-2024. We will aim to keep you regularly updated on the activities associated with implementation of the Katherine water plan, as well as other water information that may be of interest.

Plan implementation

Since the declaration of the Katherine Tindall Limestone Aquifer Water Allocation Plan in August 2019, we have started on implementation activities. One of the activities relates to the development of a monitoring, evaluation, reporting and improvement program – ensuring that activities undertaken as part of plan implementation are appropriate and able to be delivered in the most efficient and effective ways.

We will be developing this program over coming months, and we look forward to sharing it.

Flows in the Katherine River

As you would be aware, flows in the Katherine River over the 2019 dry season were lower than they have been for some years. River flow gauging was undertaken throughout the Katherine and Daly Catchment at the end of October by staff from the Water Resources Division. Flow gaugings are undertaken to verify and calibrate continuous flow measurements recorded at strategically placed gauging stations. The following flows were measured along the Katherine River (refer to Table 1 below and Figure 1 overleaf).

Table 1. Measured flows at the end of October 2019.

Date	Location	Flow (cubic meters per second)	Flow (megalitres per day)
24/10/2019	Ironwood	0.2 cumecs	13 ML/day
21/10/2019	Railway Bridge*	Approx. 0.5 cumecs	Approx. 40 ML/day
21/10/2019	Low Level*	1.5 cumecs	131 ML/day
24/10/2019	Wilden	1.8 cumecs	155 ML/day

*1 November flows as part of the annual announced allocation process under the 2016-2019 Katherine water plan were modelled at the Low Level site, but referred to in the plan as Railway Bridge. The Railway Bridge section of the Katherine River is difficult to gauge, therefore figures are presented as approximate values for the site. Further information regarding the Katherine Railway Bridge and Low Level reporting sites is available at:

https://denr.nt.gov.au/_data/assets/pdf_file/0006/429945/Important-Information-for-the-Water-Allocation-Plan-for-the-Tindall-Limestone-Aquifer-Katherine-River-Reporting-Site.pdf.

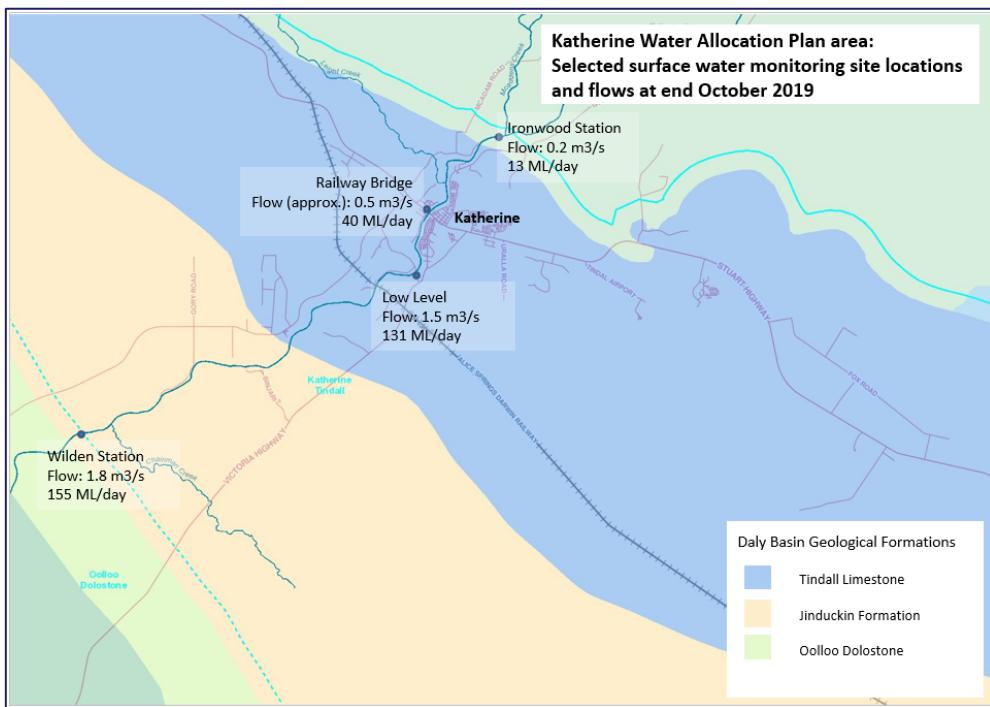


Figure 1. Katherine River within the water plan area, showing flows measured at the end of October 2019

In some cases, these river flows are the lowest that have been recorded as part of our data management systems. River flow information for the whole of the Northern Territory is available through the water data portal at <https://nt.gov.au/environment/water/water-information-systems/water-data-portal>.

Groundwater recharge and discharge

Groundwater recharge in the Top End is reliant on rainfall. Recharge to the groundwater system from rainfall generally follows a pattern over the wet and dry seasons, linked with rainfall and infiltration of water to the groundwater system.

The recharge of groundwater systems can be described as following a pattern of five intervals:

1. During the dry season there is little or no rainfall. The groundwater system does not recharge, and levels decline over the season as the groundwater continues to discharge to the rivers and creeks via springs.
2. The second interval occurs with early rains where water falling on the surface is lost to either evaporation, or used in wetting the soils. No recharge occurs and groundwater levels continue to fall as groundwater continues to discharge from the aquifer to springs.
3. The third interval occurs with increasing rain saturating the sub-soil and results in the first recharge occurring. Groundwater levels stop falling as recharge and discharge are in balance.
4. The fourth interval occurs when recharge exceeds discharge, at the peak of the wet season. The groundwater levels rise as the water held in the groundwater system increases. In some cases there may be recharge to the groundwater system from rivers when the river level is greater than the groundwater level nearby.
5. In the fifth interval, the major rains stop and recharge ceases. In a natural (unimpacted) regime, the rate of discharge progressively falls as groundwater levels drop. Groundwater levels fall faster and further where groundwater extraction occurs.

The diagram below (Figure 2) shows a generalised graph of groundwater levels and rainfall according to the intervals described on the previous page.

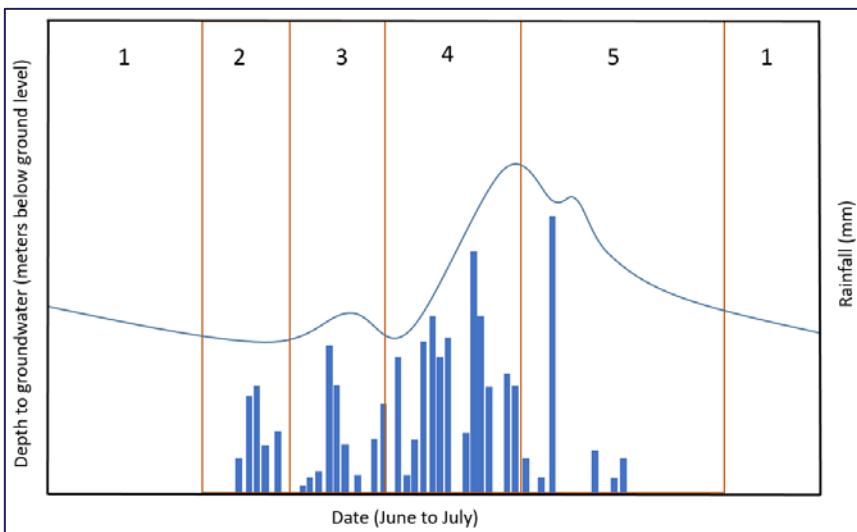


Figure 2. Stylised diagram of rainfall and groundwater levels, typical of Top End systems

Groundwater recharge in the Katherine area is currently in the second interval. While some minor rainfall has occurred, it is not yet infiltrating into the groundwater system. As the wet season progresses, it is expected that recharge will occur and that groundwater levels will rise.

Along with river flow monitoring, groundwater monitoring was also undertaken at the end of October by Water Resources staff. The monitoring of groundwater levels within bores throughout the region provides an overview of variations in groundwater levels over time and spatially across the landscape. Key monitoring bores have loggers installed to provide continuous data. Spot measurements are undertaken at additional monitoring bores at the peak of the wet, and end of the dry season to provide information over a greater spatial area.

The monitoring undertaken at the end of October tends to show the lowest groundwater levels of the season, prior to rainfall commencing and the groundwater levels transitioning from interval one to interval two.

Figure 3 shows the location of four water level monitoring bores in the Katherine plan area. Figure 4 shows the plots of water levels (depth below ground level) for these sites. Where there is data available prior to the 1998 floods, it can be seen that there was an increase in water held within the groundwater system, highlighted by a shallower water table (depth to groundwater is closer to the surface) after the floods (refer to RN022397). Figure 3 also indicates that the 2018-19 wet season did not result in significant recharge as the wet season peaks across all bores were not as significant as other years. Average groundwater levels in the three bores close to Katherine (RN022397, RN022394 and RN022288) have declined over the past twenty years.

The next Katherine water plan update will provide further detail about surface and groundwater monitoring in the region, including more information about what the monitoring outputs can tell us regarding the Katherine Tindall water system.

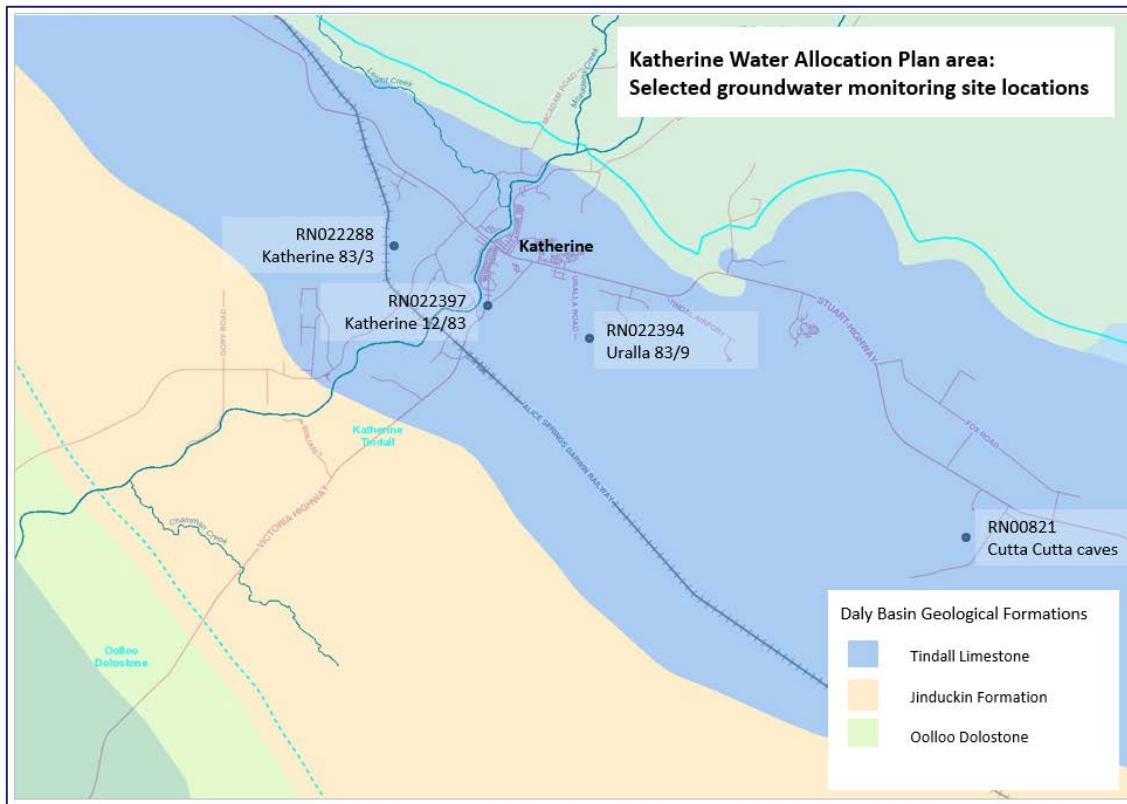


Figure 3. Location of selected bore monitoring sites in the Katherine water plan area

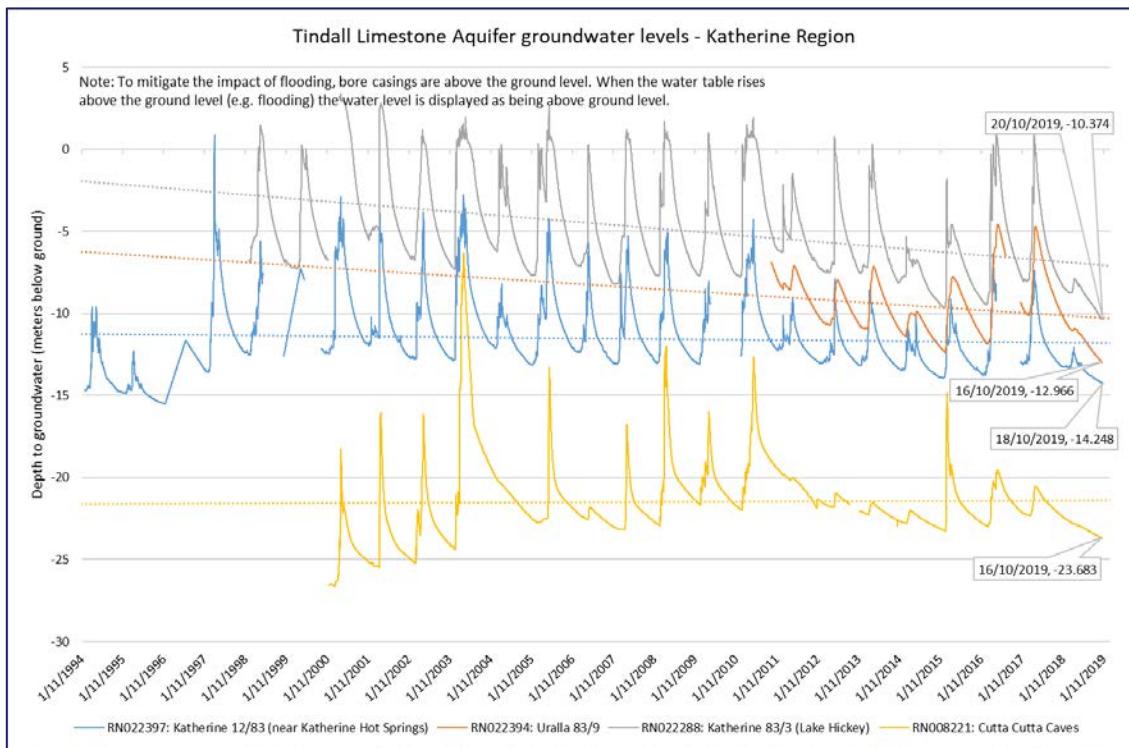


Figure 4. Groundwater levels and trends at selected monitoring sites in the Katherine water plan area

2018-19 water use

Every year, the Bureau of Meteorology produces a National Water Account. The water account provides a picture of water resources management for the previous year for the most significant and productive water use regions in the nation. The Daly basin is one of the ten reporting locations. The final water account is set to be released in December 2019 and will provide information about water use in the Daly basin.

Reporting on water availability and water use for the Daly basin is compiled annually by Water Resources Division as part of the water account. The reporting period used for the Daly system is May to April. For the 2018-19 season, water use in the Katherine Tindall Limestone Aquifer totalled approximately 30% of available water (that is, 30% of the allocated volume of water for the season was used between May 2018 and April 2019). The compliance rate for submitting water use figures from metered bores in the Katherine region is approximately 75%.

Water outlook

The Bureau of Meteorology's latest prediction for the November to January rainfall outlook states that there is an unlikely chance of above median rainfall being received in Katherine. Figure 4 shows the BoM's predictions for rainfall over the period November to January for Katherine. The historical median rainfall for Katherine over this period is 619 mm. The BoM predicts there is a 25% chance of receiving 700 mm over this period in 2019-20, and an 88% chance of receiving 400 mm. Further information about rainfall predictions are available at <http://www.bom.gov.au/climate/outlooks/#/overview/summary/>.

Figure 5 shows the total rainfall that has occurred across the Northern Territory since 1 October. There has been minimal rainfall in the Katherine region to date this season (between 1 mm and 10 mm). Significantly more rainfall will be required for the groundwater system to begin recharging.

Further information about rainfall is available from the Bureau of Meteorology's website at <http://www.bom.gov.au/climate/current/>.

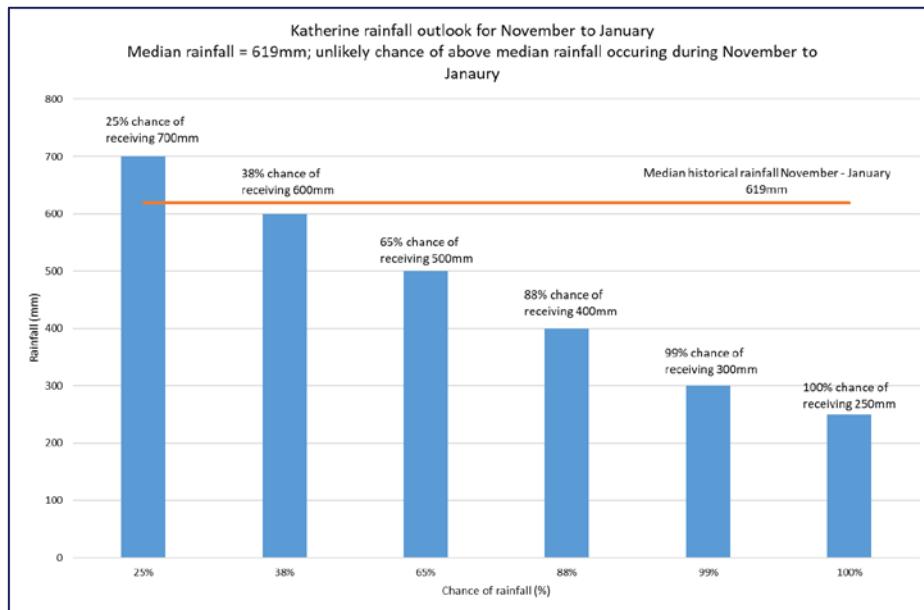


Figure 5. Rainfall outlook for November to January in Katherine. Note: past accuracy of information – low
Source: <http://www.bom.gov.au/climate/outlooks/#/rainfall/total/75/seasonal/0>

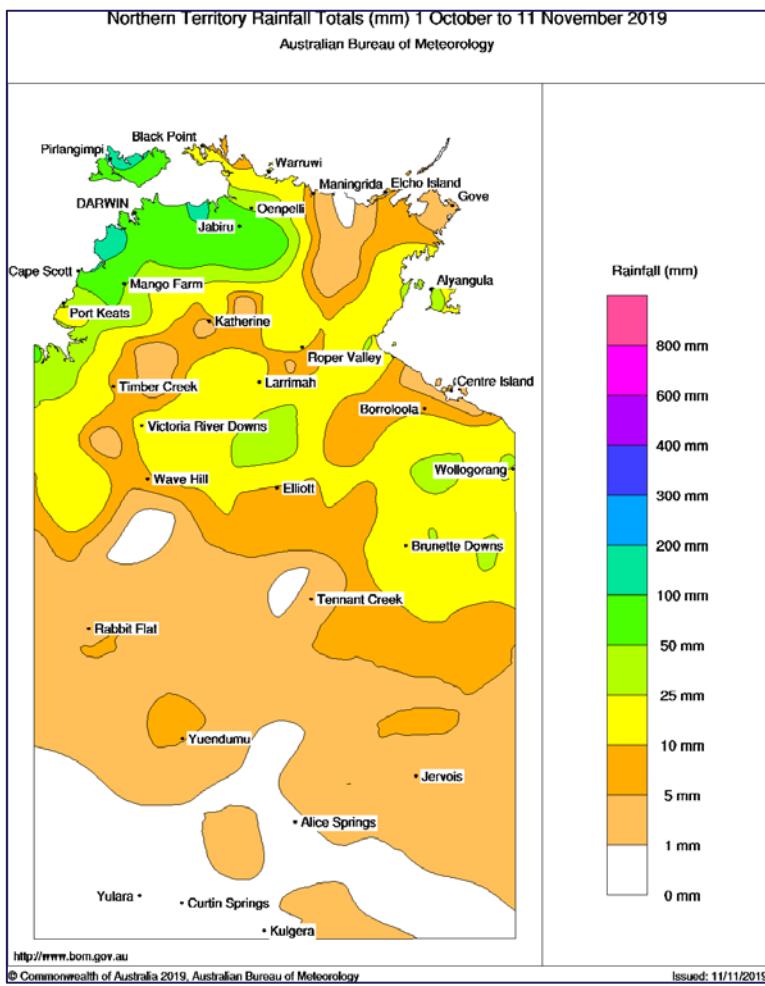


Figure 6. Rainfall totals across the Northern Territory since 1 October 2019

Source: <http://www.bom.gov.au/jsp/awap/rain/>

Announced allocation process under the new plan

The annual announced allocation process determines the maximum amount of water that may be extracted from the Katherine Tindall Limestone Aquifer system for the 2020-21 season (May 2020 to April 2021). The volume of water available to individual licence holders is determined by estimating the river flows that would likely occur if there was no extraction (referred to as 'natural' or 'unimpacted'). The outcomes of this estimate determine the level of impact that is allowable to the system from extraction of groundwater and surface water through the system. The principles used to determine the allowable level of impact are detailed in section 8.1 (page 54-58) of the 2019–2024 Katherine water allocation plan (available at www.denr.nt.gov.au/katherinewaterplan).

Over coming months, water resource modelling will be undertaken to determine the predicted natural flows in the Katherine River system, and link this with the information detailed in the Katherine plan.

If the water resource modelling determines there would be an unacceptable level of impact if every licence holder used their maximum licensed volume of water (i.e. 100% of their licensed volume), there may be a requirement to restrict how much water may be used over the season. Security levels of licences determine the order in which restrictions are imposed, with low security licences restricted first, followed by medium security and then high security.

We are not yet able to provide an indication of what the announced allocation outcome may be. This is because the modelling requires information about catchment rainfall run-off, rainfall infiltrating into the soil and down into groundwater, and flow in the creeks and rivers. As the wet season provides the major input of water into aquifer systems in the Top End, information about the wet season rainfall is a critical component of the model. This information can only be included once the wet season is well underway.

We will keep you updated about annual announced allocation information as it becomes available.

Further information on water management principles, including water resource modelling is available from <https://denr.nt.gov.au/water/water-management/water-management-principles>. Further information about the annual announced allocation process specific for the Katherine plan area is available from www.denr.nt.gov.au/katherinewaterplan.

In other news

The Oolloo Dolostone Water Allocation Plan 2019-2029 was declared on 13 November 2019. It is now available at www.denr.nt.gov.au/olloowaterplan.

More information

For more information about water planning in the Northern Territory, please visit www.denr.nt.gov.au/water.

If you have queries or would like to discuss anything about this update further, please contact the Katherine Water Planner (Bridie Velik-Lord) via email at bridie.velik-lord@nt.gov.au or by phone on 8999 4017.

If you wish to subscribe to future Katherine water plan updates, please let us know by sending an email to waterresources@nt.gov.au.

Header image: Katherine River at the new railway bridge, 20 June 2019. Department of Environment and Natural Resources, Water Resources Division.