

Tindall Mataranka to Daly Waters Water Advisory Committee

Meeting Record 8

13 March 2019 - 10.00 am

Jawoyn Association Conference Room, Katherine

Members Present

Rebecca Mohr-Bell
Rohan Leach
Sharon Hillen
Tim Helder
Clair O'Brien
Ben Lewis

Independent Chair
Proxy for NT Cattlemen's Association
Roper Gulf Regional Council
Proxy for Peter Rix, Quintis, Water Extraction Licence Holder
Regenerative Agriculture
Proxy for Allister Andrews, Jawoyn Association (by teleconf)

Members Absent

Sarah Kerin
David Ciaravolo
Vin Lange
Helena Lardy
Jocelyn James
Kerry Roberts

Department of Tourism, Sport and Culture
Amateur Fishermen's Association of the Northern Territory
Centrefarm / TopEnd Farm
Jilkminggan Community Aboriginal Association
Jilkminggan Community Aboriginal Association
Jilkminggan Community Aboriginal Association

Advisors Present

Christine Long
Tim Bond
Michelle Rodrigo
Des Yin Foo
Liza Schenkel

Executive Director Water Resources, DENR
Director Water Planning and Engagement, DENR
Water Planner, DENR
Director Water Assessment, DENR
Community Engagement Officer, DENR

Observers

Pru Ducey

DENR - Minutes

1. OPENING**(Chair)**

Meeting opened at 10.05am.

The Chair thanked everyone present for attending.

1.1. Apologies

Sarah Kerin	Department of Tourism and Culture
Vin Lange	Centrefarm / TopEnd Farm
Helena Lardy	Jilkminggan Community Aboriginal Association
Jocelyn James	Jilkminggan Community Aboriginal Association
Kerry Roberts	Jilkminggan Community Aboriginal Association
David Ciaravolo	Amateur Fishermen's Association of the Northern Territory

The Committee was advised that Liam Golding (previously a proxy for Jawoyn Association) is interested in being a representative for the Environment and that Jenny Davis, a Freshwater Ecologist at CDU may be available to replace David Crook who resigned last year.

There are a number of processes to work through in terms of formalising membership of the Committee. Michelle Rodrigo will talk with everyone individually about these matters.

The meeting agenda was approved without changes.

2. MINUTES OF MEETING 7**(Chair)**

- ❖ **DECISION:** The Committee agreed that the Minutes of Meeting 7 held in Mataranka 25 October 2018 and the Minutes of Meeting 7b held via teleconference on 6 December 2018 are a true and correct record.

The Committee noted the importance of Aboriginal representation and contribution to the meetings and expressed disappointment that Jilkminggan representatives were not present. Michelle Rodrigo is visiting Jilkminggan Community tomorrow to speak with members about the meeting and outcomes.

Opportunities/suggestions for improved engagement:

- Roper Gulf Shire Council has two elected members who live in Jilkminggan
- Jawoyn administers the Ranger program and may be able to work with Council to assist with engagement
- Visits to Jilkminggan have occurred on several occasions. Summary of discussions has been captured in minutes of previous Committee meetings.
- Need to ensure people from other land trusts like Wubalawun Aboriginal Land Trust are properly consulted.
- Possible establishment of an Aboriginal Reference Group has been discussed for Mataranka and other Katherine region water plan areas; build and share understanding of water management to feed into the WAC.
- Planning & Engagement team, through Liza Schenkel, are increasingly engaging with Jawoyn and Mangarrayi ranger groups to undertake water monitoring and cultural mapping in Katherine River and Roper River catchments.

- ❖ **ACTION:** Sharon Hillen to send through a list of members of the local authority.

3. BUSINESS ARISING FROM THE MINUTES

(Chair)

Action #	Responsibility	Action	Status
7-2	Michelle Rodrigo	Liaise with Committee to arrange meeting to update Jilkminggan members	Ongoing Visits on 21/8/18, 24/10/18, 13/3/19
7-3	Michelle Rodrigo	Seek permission to share notes from discussions at Jilkminggan and circulate to the Committee as attachments to meeting minutes	Ongoing Notes from visit 24/10/18 were included in minutes of Meeting 7
7-4	Michelle Rodrigo	Look at evidence of discharge zones in the Roper; more analysis needed to determine where discharge zones are, and to develop scenarios for buffer zones	To be discussed in Meeting 8
7-6	Michelle Rodrigo	Provide more information on climate change and how this is incorporated into scenario modelling and the Plan.	Information and discussion in Meeting 8
7-12	Michelle Rodrigo	Planner will further develop the Outcomes/Objectives table and provide more advanced version to Committee for comment	Ongoing In progress - to be provided in papers for Meeting 9
7-13	Michelle Rodrigo	Planners to discuss with Aquatic Health Unit the possibility of providing a summary of all available data to the Committee. Michelle will report to the Committee at the next meeting. Meeting 8 – Planner advised there is already considerable data and publications available, which represents the best data we have on water quality parameters. Committee provided with a Fact Sheet on the results of the 2018 groundwater quality survey – see Appendix 1 or the full report at http://territorystories.nt.gov.au/jspui/handle/10070/306600	COMPLETED
7-14	Sharon Hillen	Investigate whether any testing has been done in relation to septic tanks in the Mataranka area and possible leaching of nutrients into the groundwater system	Ongoing Full report on groundwater quality survey 2018 (see link above) includes information on nutrient levels
7b-1	WAC members	WAC to consider the Minutes of Meeting 7 held in Mataranka 25 October 2018 out-of-session.	COMPLETED Approved at Meeting 8
7b-2	Pru Ducey	Action items from Meeting 7 to be emailed to members as a reminder to follow up items against their names.	COMPLETED
7b-3	Michelle Rodrigo & Pru Ducey	Michelle Rodrigo and Pru Ducey to work with individual members to document personal details required to re-establish the Committee under a formal 'instrument' of appointment.	Ongoing

Action #	Responsibility	Action	Status
7b-4	Michelle Rodrigo & Pru Ducey	Contact individual members to discuss changes to the way members are paid sitting fees/attendance expenses now that government cannot accept invoices from Board (WAC) members.	COMPLETED Discussed and paperwork provided to relevant members
7b-5	Michelle Rodrigo	Circulate weblink to the Strategic Aboriginal Water Reserve Policy Framework	COMPLETED
7b-6	Michelle Rodrigo & Pru Ducey	The briefing paper provided for this meeting 7b is to be re-sent to all members, with some key points for consideration at the next face to face meeting. Members can call Michelle Rodrigo with any queries between meetings.	COMPLETED Key elements of 7b paper incorporated into Meeting 8 paper
7b-7	Michelle Rodrigo	Circulate briefing papers for members to read and comment on between meetings. Papers will have several key questions to help focus discussion and feedback.	Noted
7b-8	Pru Ducey	Options for 2019 meeting dates to be circulated via Doodle Poll following this meeting.	COMPLETED

- ❖ **ACTION** – Pru Ducey/Michelle Rodrigo – Action items from each meeting to be included on back page of Meeting Agenda.

The Chair advised she had been approached by ABC Rural for comment on progress of the Plan. This interview went to air this morning. A copy will be provided to members.

Members were reminded that the Chair is the media spokesperson for the Water Advisory Committee. All media enquiries should be directed to the Chair.

The Committee will aim to summarise the key points at the end of each meeting. This can be referred to in any interaction with the media.

The Committee noted that licensing of water and management of existing licenses is not a matter for the WAC. The WAC's role is to provide advice on water allocation planning.

4. NATURAL WATER BALANCE OF THE MATARANKA TINDALL LIMESTONE AQUIFER (Director, Water Assessment)

Des Yin Foo, Director Water Assessment, delivered a presentation on the Natural Water Budget of the Mataranka Tindall Water Allocation Plan area - see Appendix 2 for presentation slides.

Summary of key elements in the presentation

- There is no clear consensus on how climate change modelling for water resources should be undertaken. The CSIRO approach is based on about 15 global climate models which they think are the most representative/applicable for Australia. From this they have developed outputs for different scenarios - worst case, average case, and minimum change.
- Climate of the Top End of northern Australia is not expected to change a great deal. The CSIRO approach is used in the department's modelling of aquifer recharge. In the southern parts of the Top End (e.g. Larrimah area) some reduced rainfall is expected, and this is more pronounced further south in the arid zone.

- The Roper model is an integrated groundwater-surface water hydro-geologic model. It has characteristics embedded in it, and can tell us how groundwater and surface water might respond to changes in climate or water resource extraction.
- More intense rainfall may mean less aquifer recharge. More intense events may result in more run off than recharge.
- Between Eley Homestead gauging station and Red Rock gauging station an estimated 2.5 cumecs (cubic metres per second) of stream flow is lost to evapotranspiration.
- The entire Roper river system depends on groundwater emanating from the Tindall Limestone aquifer in the Plan area. This is a very important consideration for the planning process.
- Rainfall record – rainfall has been increasing since the mid-1970s
- Groundwater levels – bores in the South Mataranka zone show rising groundwater levels since the 1990s (corresponds with high rainfall in same period)
- Lateral groundwater flow – very slow rate of flow from south (Georgina Basin) to north (southern Daly Basin); lag time means that any adverse impact on the aquifer will continue for many years, even if management changes immediately – cumulative or delayed impact.
- Aerial aquifer recharge – modelling indicates that a very small proportion of total precipitation ends up as recharge to the aquifer.

5. PROPOSED WATER SHARING ARRANGEMENTS FOR MATARANKA TINDALL PLAN Setting environmental/cultural water requirements and the estimated sustainable yield (ESY)

Members were provided with an agenda paper containing background information and proposals for feedback.

To date, the WAC has provided advice on the revision of the Water Allocation Plan boundary and the delineation of management zones.

Clair O'Brien asked for it to be noted that her preference for the Plan boundary was to stay with the version which included Daly Waters and parts of the Beetaloo sub-Basin, rather than change the Plan boundary to exclude the Beetaloo sub-Basin, as it now does.

Discussion of spring protection

Discussion of the potential impacts of bores and extraction located very close to springs. Committee asked if these bores can be treated differently to other bores in the zone?

The Katherine Tindall and Ooloo Dolostone water allocation plans include 'groundwater discharge protection areas' where groundwater discharges to the Katherine River. This could be incorporated as an additional management overlay where relevant in the Mataranka Tindall plan e.g. in the South Mataranka Zone.

- ❖ **COMMITTEE RECOMMENDATION:** Consider establishing a groundwater discharge protection zone around the Roper to ensure groundwater dependent ecosystems (GDEs) likely to be impacted by groundwater extraction are properly protected.

Discussion of connectivity along the Roper River

Before water can be allocated to beneficial uses (consumptive uses), the Water Allocation Plan must first identify what the environmental and cultural water needs are and demonstrate that the water-sharing arrangements in the Plan make adequate provision for these needs.

The Roper hydrological model considers surface water and groundwater together, and can also model expected downstream impacts.

Committee expressed a consensus view that surface water extraction downstream of the Plan area (e.g. Roper Valley area) should be considered in decisions about water-sharing arrangements for the

Mataranka Tindall aquifer. The Committee acknowledges that in the dry season, water flowing down to Roper Bar has originated primarily from the Tindall Limestone Aquifer. Downstream of Elsey Homestead, the river becomes a 'losing' stream which means stream flow decreases with distance from Elsey Station to Roper Bar. The river is almost totally dependent on groundwater discharges from within the Plan area to support dry season baseflows all the way to Roper Bar.

The Estimated Sustainable Yield set in the Plan is the amount of water that can be diverted from the aquifer/stream without causing detrimental impact to the natural system. Once a volume of Tindall Limestone groundwater is allocated to consumptive uses, the Committee expressed the view that the undiverted stream flow in the dry season (which equates to groundwater) should not then be available for surface water extraction further downstream. Surface water extracted from any part of the Roper in the dry season, should be treated as groundwater from the Tindall Limestone Aquifer during the dry season.

In the dry season, water flowing towards Ngukurr originates as groundwater within the Plan area. Further consultation with Ngukurr community is needed – Yugul Mangi Corp, Power and Water, and at least 2 other Aboriginal organisations depend on surface water from the Roper Bar/Roper Pool area.

Downstream users are effectively competing for the same resource as those in the Plan area during the dry season. This could result in lost opportunities for downstream water users if they are not included in water-sharing arrangements for the Mataranka Tindall Plan area.

Water could be a tradeable resource – limitation for the Roper region is that trade can only take place within a WAP area. The Committee noted that under the current rules, water trading cannot occur outside a WAP area.

Authorised surface water extraction of 1,600ML/yr currently occurs in the Roper Valley area to service the Ilmenite Mine.

Committee discussed the potential for expanding the WAP area to include a corridor along the Roper River.

❖ **COMMITTEE RECOMMENDATIONS:**

- The Plan should recognise that downstream dry season baseflow in the Roper River originates from the Tindall Limestone Aquifer and that this groundwater is a key component of the natural water balance and ecological function of the wider Roper system. The water-sharing arrangements established by the Plan should account for this connectivity.
- The current water allocation plan is to be completed using the existing boundary, with the initial review of the Plan to occur in 2021 (2 years after commencement, and to coincide with full transition of mining and petroleum into the *Water Act*) at which point the entire Roper River should be formally incorporated into the Plan's remit.
- The planning process identifies and consults with downstream stakeholders on water allocation planning.

- ❖ **ACTION** – the Department will explore options for extending the Plan boundary to include the entire river corridor and report back to the WAC.

Discussion of Estimated Sustainable Yield (ESY)

The ESY is the amount of water that can be taken from the water resource to support declared beneficial uses without compromising key cultural and environmental values, ecosystem functions, or the productive base of the resource.

Annual aquifer recharge is one element of the natural water balance that can be used as a surrogate for the total volume of water available in the system. A percentage of recharge can then be assigned to the ESY (the volume of water that can be taken from the resource for consumptive beneficial uses without compromising environmental and cultural values).

Median values for recharge – the Committee discussed the rationale for using ‘median’ values instead of ‘mean’ values to determine a figure for long-term annual recharge, and agreed that use of ‘median’ values provides a figure that is more typical of actual annual recharge which is not influenced by occasional climate extremes and is consistent with scientific best practice.

- ❖ **COMMITTEE RECOMMENDATION:** Proceed with the use of ‘median’ values when calculating long-term annual recharge figures for the Plan area and each management zone.

Discussion of the appropriate data period for median annual recharge calculations

The WAC was presented with options and logic for utilisation of a 58-year or 118-year rainfall/climate data period in determining median annual recharge values.

The modelling undertaken to develop the natural water balance (presented at this meeting) has utilised 118 years of rainfall data (combination of observed and modelled data). The model generates a value for annual recharge for each of those 118 years. To establish a figure for median annual recharge a decision about the span of years on which the median is based must be made. The options are to take the median of all 118 years, or a 58 year period from 1960 to 2018 for which the department has actual observation data from stream gauging stations which can be correlated with the modelled data. The 58-year period includes the extreme dry spells of the 1960s and also more recent wet periods. This 58 year period can be used to show how well the model outputs calibrate with real monitoring data during that period.

Committee members present indicated a preference for use of the longer 118-year period to calculate median recharge values, as this provides a more conservative assessment of annual recharge and a contingency if the current climate trends towards a period of lower than average rainfall.

Committee discussed the review of climate data and updated modelling that would be undertaken at the 5-year review of the Plan, to inform us about how the resource is likely to respond in the ensuing 5 years.

The department has previously had advice from CSIRO and the BoM that the 58-year period is likely to be a better indicator of climate conditions in the coming decades than the longer data period, and that the 1960s to 1990s is generally accepted by BoM as ‘climate normal’.

Committee advised that consideration must be given to water security levels for water-dependent businesses, considering the long-term investment they make in infrastructure.

Greater certainty about water availability for business and public benefit is the priority – need some kind of benchmark that cannot be changed. Commencement of the Plan with a smaller ESY amount will provide greater water security for all users over the life of the Plan.

Consideration of historical river flows:

- modelling suggests that the river may have ceased flowing during the extreme dry of the early to mid-1900s, but there is no observation data available to support this. Stream gauging only commenced in the late 1950s.
- as water users we don’t want to set up water-sharing arrangements that cause the river to cease flowing more often than it would if no extraction was occurring (natural conditions).
- use the Roper model to test scenarios e.g. to understand how groundwater levels and river flow might respond to 3 or 4 consecutive dry years.

Discussion of current interest in wet season flood harvesting for agriculture and retaining water in dams to supplement recharge of aquifer; the terrain of the area is not very suitable for large dams.

- ❖ **COMMITTEE RECOMMENDATION:**
 - Median annual recharge values should be based on the longest available period of data (118 years), which is added to each year, on the basis that it provides increased security and reliability for all users, and provides greater capacity to sustainably manage water needs in the future.

- o Ensure the views of members not present at the meeting today are heard on this matter, noting that those members present at the meeting prefer the use of the longer 118-year data set.

Discussion of extraction scenarios to be modelled, including consideration of climate change

Analysis of climate forecasting shows that climate of the Mataranka region is not likely to change significantly in the coming decades as a result of climate change, although natural climate variation from year to year (inter-annual variation) is very typical for this region. Average annual rainfall for Mataranka is 970 mm. In the 1940s, 1950s and 1960s annual rainfall was down around 600 mm.

Committee suggested the model should be run to:

1. predict the response of groundwater discharge and river flows under three consecutive dry years of 600mm annual rainfall.
2. determine how many consecutive dry years it would take to cause the upper Roper to cease to flow i.e. cessation of groundwater discharge.

Committee supported further analysis of the modelled data for groundwater levels and river flows in the 1950s to understand how that period of extremely dry conditions impacted the aquifer and Roper flows.

Other extraction scenarios were presented in the agenda paper for the Committee's consideration:

Scenario type	Scenario description	% median annual recharge extracted
Natural	Zero extraction of surface or groundwater (pre-development)	0%
Current water entitlements	Current volume under licensed extraction plus estimate of Rural Stock & Domestic/small groundwater uses	15%
Proposed ESY	Based on 80:20 guideline, with adjustments for dry & very dry years.	20%
Enhanced extraction	Extraction expands beyond current estimated demand e.g. if a new high water use industry enters the region.	25%

Models will be run by the Water Assessment team and the outputs will be presented and explained to the Committee at the next meeting.

Committee requested information about how expected temperature and rainfall projections overlays with Mataranka Tindall management zones.

Following the WAC meeting, the information below was extracted from a CSIRO report on NT climate predictions for 2030 and 2070 (relative to 1990 conditions) in relation to the Mataranka Tindall Water Allocation Plan area:

- little change expected in wet season rainfall by 2030 and 2070
- likely reduction in dry season rainfall, around 20% reduction by 2030 and 60% reduction by 2070; in comparison, dry season rainfall in the Darwin area is likely to increase
- climate change will increase potential evaporation; the difference between rainfall and potential evaporation is called the atmospheric moisture balance. In the Plan area, the moisture balance in the dry season is expected to decline by 20-100 mm by 2030 and 70-320 mm by 2070. Wet season atmospheric moisture is also expected to decline around Mataranka, and even more significantly from Daly Waters south.
- by 2030, the average number of days over 40°C is expected to rise by 3 -35 days at Larrimah; by 2070 the likely increase in days over 40°C is 12-157 days (noting that by 2070 the range of uncertainty in average warming is much larger)

Source: Hennessy, K. et al (2004) *Climate Change in the Northern Territory*, CSIRO
For full report go to: http://www.cmar.csiro.au/e-print/open/hennessy_2004a.pdf

Discussion about setting sustainable water-sharing arrangements

The *NT Water Allocation Planning Framework* provides a guideline that at least 80% of recharge to Top End aquifers is reserved for the environment and cultural purposes, where there is insufficient scientific information available to determine an alternative volume.

There is a lot of scientific hydrological, ecological and cultural knowledge available for the Mataranka Tindall Plan area (western science and Indigenous knowledge), but what is lacking is the quantitative information about environmental water needs. For example, what is the minimum flow required at Eley station on 1 October to maintain all the groundwater dependent ecosystems downstream? What flood flows and baseflows are required to sustain large wetland areas (e.g. Red Lily) that are important places for traditional subsistence hunting? Is a minimum baseflow over shallow structures like Roper Bar critically important for fish migration?

The 80:20 guideline in the *NT Water Allocation Planning Framework* is available as a contingency water-sharing arrangement in situations like this where we may not have enough quantitative information to set evidence-based environmental and cultural flow requirements.

Discussion of ESY adaptation under variable climatic conditions

The Committee discussed a proposal to define five categories of climate condition with a reduced ESY for 'dry' and 'very dry' climate conditions, and a stable, constant ESY in 'average', 'wet' and 'very wet' conditions to allow for replenishment of aquifer storage and buffering of baseflows in subsequent 'dry' spells.

Committee suggested:

- "very dry" should be defined by consecutive dry years; a single dry year shouldn't necessarily be justification to reduce the ESY
- "very dry" might represent the bottom 20% of stream flow and rainfall data (20th decile)
- could the measure for "very dry" conditions be a cease to flow event at Roper Bar?
- should consider not only flows and rainfall, but also recharge rates - there is a lag (especially in Larrimah zone) in detecting the impact of a single poor rainfall year on recharge. Should recharge or rainfall be the determinant of a 'very dry' year? Need to establish a prescriptive approach such as water level or flow rate at Roper Bar. Is this the right sort of metric?
- use decile categories for defining climate condition, the same as the BoM

The Committee discussed the over-arching principle of adapting the estimated sustainable yield (ESY) to climate conditions, and requested further information and definition of each category of climate condition before the Committee can provide recommendations on the setting of the ESY.

Input provided by Water Advisory Committee members/proxies who were unable to attend all or part of the meeting:

Sarah Kerin:

- Table 3 (page 9) of the meeting paper shows the long term median annual recharge estimate of 35,000ML. What is the timeframe? How many years constitute 'long term'?
- Management zone allocations relative to climatic conditions:
For me the precautionary principle applies here - my preference is that the minimum percentages be applied uniformly across all management zones, with the Larrimah zone mimicking the two northern ones. I note the advice supporting the different percentages for the Larrimah zone, however, for me the precautionary principle applies as even though there is less direct connection and the discharge times are over several hundred years it is still part of the overall system.
- I note the current water entitlements and use on page 10 and the allocation for South Mataranka with the possible implications for water sharing and the SWR here. This clearly needs further discussion within the Committee and advice from the Dept.

Ben Lewis:

Qu 1. Does the proposed approach to water-sharing and setting of the estimated sustainable yield seem logical and reasonable?

- Yes, but consider using longest available rainfall period (reducing ESY). I understand that ground water and surface water flow history (from 1960 on) is important to calibrating the model. Katherine Tindall WAP is now faced with a reduction in ESY now that it looks at the entire rainfall history.

Qu 3. What elements, if any, might water users be most concerned about and why?

- downstream Roper attitude is important, think about dry season flows over Roper Bar and the freshwater pool below, plus the development aspirations of potential downstream consumptive users.
- reliability of high and medium security licences is important, especially for those longer term tree crops
- security should be signalled by land capability and ultimate or the most beneficial use rather than just the development stage.

Qu 4. In what ways, if any, should any element of the proposed approach be modified to improve the quality and effectiveness of the Plan's water-sharing arrangements?

- clarify what 'dry' or 'very dry' climatic periods are - is it one season or more like 10 years of lower than average rainfall?
- can we use security levels better to maintain critical flows in driest years, but supply a significant quantity of reliable water?
- how useful is better control over extraction very close to discharge (a modelling question)?

Patterns of rainfall can also affect recharge. For example, Darwin has received 800mm to date, but as it has dried out between falls, recharge of the Darwin aquifers has been negligible.

- ❖ **ACTION** – Arrange for the modelling team to run some scenarios based on discussions today (noting the current capacity of the team and competing demands on their time). Committee will revisit the water-sharing arrangements when the modelling results are available.

With regard to licensing, the Executive Director indicated that the Licensing Framework will be looked at as part of the Water Reforms Directions Paper.

Information and discussion of current water entitlements and use

The level of actual use of licensed water entitlements in the Mataranka Tindall Plan area is currently sitting at about 28%.

Current use levels fall well within the amounts proposed for ESY, even under 'very dry' conditions.

Rural Stock and Domestic – the Water Assessment team are undertaking work to refine this estimate for the new Plan boundary.

Surface water extraction – currently no licenced surface water extractions within the Plan area, but downstream there is authorised extraction by mining operations and public water supply which need to be considered within the broader context of how discharge from the Tindall aquifer supports downstream baseflows e.g. at Roper Bar and Ngukurr.

Strategic Aboriginal Water Reserve entitlements – to be included in the Plan as a beneficial use and will be assigned an allocation according to the SWR Policy Framework. A table of SWR entitlements for each management zone and a map showing eligible land under SWR was provided to the Committee. Eligibility by land area is highest in the South Mataranka Zone, followed by North Mataranka Zone and then the Larrimah Zone.

More information is needed as to the cumulative effect of consecutive years of low rainfall. Need more certainty that under extraction, the aquifer can recover after consecutive dry years. This knowledge would assist the Committee to make an informed recommendation regarding water-sharing and allocations to the environment and cultural uses.

- ❖ **ACTION** – Planning team to revise proposed water-sharing arrangements based on median recharge over the longer climate period of 118 years (1900-2018).
- ❖ **ACTION** – Planner to request further hydrological modelling to a) define a 'dry', and a 'very dry' year, starting with the scenario of 3 years of 600mm rainfall (unless the Water Assessment team recommends a more appropriate scenario), and b) to understand how the water resource is likely to respond in these climate conditions.

6. NT WATER REGULATORY REFORM

(Executive Director, Water Resources)

The intent was to have a question and answer session, time permitting.

The 'Have Your Say' process for public comment on the *Directions Paper* will close at the end of March. Organisations with a significant level of interest in the reform process have until the end of April to make submissions. Written submissions can be sent to Christine Long, Jo Townsend or to Water Resources. Christine Long advised that WAC members can have till the end of April to make a submission on the Directions Paper.

- ❖ **ACTION** – Members to submit any questions about the Directions Paper to the Chair, who will collate these and send to Christine Long. Answers provided will be circulated to members.

7. FUTURE MEETING DATES

(CHAIR)

There are two more meetings in the current WAC workplan.

The next meeting (Meeting 9) will be held over a day and a half in the week beginning Monday 20 May 2019. Current preference is for either Tuesday/Wednesday or Wednesday/Thursday.

Meeting 10 will be the final meeting at which the full draft plan will be presented. This will be held during the week beginning Monday 29 July 2019.

- ❖ **ACTION** – The preferred date for Meeting 9 is to be determined via Doodle Poll organised by the Planner within the next week.

8. KEY MESSAGES FROM THIS MEETING

1. Groundwater –surface water connectivity

Groundwater of the Tindall Limestone in the Mataranka Water Allocation Plan area is directly connected to stream flow along the entire length of the Roper River. The Committee acknowledges this connectivity and the dependence of downstream river ecosystems on the dry season baseflows which originate as groundwater from the Plan area. The Committee has asked the Department to explore options for future of expansion of the Plan area to include the Roper River corridor, with the aim of transitioning to an expanded Plan as part of a scheduled review of the declared Plan.

2. Statistical considerations for determining long-term annual aquifer recharge

- a) The Committee discussed the use of annual aquifer recharge as a surrogate for total groundwater availability in the Mataranka Tindall groundwater resource. The Committee considered advice on the use of 'median' rather than 'mean' values for calculating annual recharge, agreeing to the use of 'median' values on the basis that this figure is a better representation of typical annual recharge, not skewed by infrequent extremes of rainfall as would be the case with a 'mean' value.
- b) The Committee considered statistical matters in relation to the timespan (years) on which 'median' values would be based, expressing a strong preference for use of the longest data set available i.e. modelled values for recharge, discharge etc. for the period 1900 to present. The Committee believes this approach will result in water-sharing arrangements that will facilitate better long-term water security for all water users, including the natural environment. The Committee also intends to collate the views of other members not present at this meeting on this matter and to confirm their position at the next meeting.

3. Climate change considerations

The Committee discussed climate change predictions for the Top End and how this should be incorporated into hydrologic modelling and the determination of water-sharing arrangements for the Mataranka region. The Committee asked the Department to undertake some modelling to improve understanding of how the groundwater resource and Roper flows might be affected by consecutive years of below average rainfall.

4. Mataranka Tindall natural water balance presentation

The Committee received a highly informative presentation from DENR Water Assessment on the natural water balance (aquifer inflows and outflows) of the Mataranka Tindall Plan area and management zones. It was suggested that this information could be developed into a Water Resources online story for broader communication.

5. Definition of climate condition categories and the estimated sustainable yield

The Committee had substantial discussions about the classification of different climate conditions for the Plan area, and subsequently how water-sharing arrangements might be adjusted under different conditions. The Committee considered the over-arching principle of adapting the estimated sustainable yield (ESY) to climate conditions, and requested further information and analysis of the characteristics that define each category of climate condition (e.g. what features distinguish 'wet' climate condition from 'very dry' climate condition?) before the Committee can provide further recommendations on the setting of the ESY.

6. Ongoing Aboriginal engagement in the planning process

The Committee emphasised throughout the meeting the importance of comprehensive and meaningful engagement with Aboriginal stakeholders and is supportive of further efforts by the Department and members to continue this work, noting the engagement activities already being undertaken by the Water Planning team.

7. Next Committee meeting

The Committee agreed to meet again in late May 2019 over 1.5 days in Mataranka, and to create opportunities for input from Aboriginal stakeholders during this time.

Meeting closed 3.03pm

Summary of Actions arising from Meeting 8

Action #	Responsibility	Action	Status
8-1	Sharon Hillen	Sharon Hillen to send through a list of members of the local authority.	New
8-2	Pru Ducey/ Michelle Rodrigo	Action items from each meeting to be included on back page of Meeting Agenda.	New
8-3	Planning team - Michelle & Tim	The Department will explore options for extending the Plan boundary to include the entire river corridor and report back to the WAC.	New
8-4	Michelle Rodrigo & Des Yin Foo (Water Assessment)	Arrange for the modelling team to run scenarios based on discussions today (noting the current capacity of the team and competing demands on their time). Committee will revisit the water-sharing arrangements when the modelling results are available.	New
8-5	Michelle Rodrigo	Planning team to revise proposed water-sharing arrangements based on median recharge over the longer climate period of 118 years (1900-2018).	New
8-6	Michelle Rodrigo & Des Yin Foo	Planner to request further hydrological modelling to a) define a 'dry', and a 'very dry' year, starting with the scenario of 3 years of 600mm rainfall (unless the Water Assessment team recommends a more appropriate scenario), and b) to understand how the water resource is likely to respond in these climate conditions.	New
8-7	Committee members	Members to submit any questions about the Water Reforms Directions Paper to the Chair, who will collate these and send to Christine Long. Answers provided will be circulated to members.	New
8-8	Michelle Rodrigo	The preferred date for Meeting 9 is to be determined via Doodle Poll organised by the Planner within the next week.	New

Decisions arising from Meeting 8

Decision #	
8-1	The Committee agreed that the Minutes of Meeting 7 held in Mataranka 25 October 2018 and the Minutes of Meeting 7b held via teleconference on 6 December 2018 are a true and correct record.

Recommendations arising from Meeting 8

Recommendation #	
8-1	Consider establishing a groundwater discharge protection zone around the Roper River to ensure groundwater dependent ecosystems (GDEs) likely to be impacted by groundwater extraction are properly protected.
8-2	The Plan should recognise that downstream dry season baseflow in the Roper River originates from the Tindall Limestone Aquifer and that this groundwater is a key component of the natural water balance and ecological function of the wider Roper system. The water-sharing arrangements established by the Plan should account for this connectivity.
8-3	The current Water Allocation Plan is to be completed using the existing boundary, with the initial review of the Plan to occur in 2021 (2 years after commencement, and to coincide with full transition of mining and petroleum into the <i>Water Act</i>) at which point the entire Roper River should be formally incorporated into the Plan's remit.
8-4	The planning process identifies and consults with downstream stakeholders on water allocation planning.
8-5	Proceed with the use of 'median' values when calculating long-term annual recharge figures for the Plan area and each management zone.
8-6	Median annual recharge values should be based on the longest available period of data (118 years), which is added to each year, on the basis that it provides increased security and reliability for all users, and provides greater capacity to sustainably manage water needs in the future.
8-7	Ensure the views of members not present at the meeting today are heard on this matter, noting that those members present at the meeting prefer the use of the longer 118-year data set.

END



Mataranka Tindall Aquifer

Groundwater quality survey 2018

Background

Activities like agriculture and urban development can sometimes lead to contamination of ground and surface waters with toxic chemicals and nutrients.

Between 2011 and 2014 very low levels of pesticide contamination and elevated nitrate levels were detected in the Katherine, Roper and Daly River systems during the dry season.

This can affect ecosystem health because pesticides can be toxic to aquatic life, while nutrients can cause algal blooms.

During the dry season the water in flowing rivers and creeks comes from groundwater.

The nutrient nitrate is the most common groundwater contaminant worldwide.

Its main human sources are sewage, fertilisers and animal manure.

Pesticides are used widely in infrastructure maintenance and domestic pest control and are an integral part of modern agriculture, and can enter groundwater.

The Water Resources Division has been conducting baseline groundwater quality surveys in the main aquifers of the Top End since 2015.

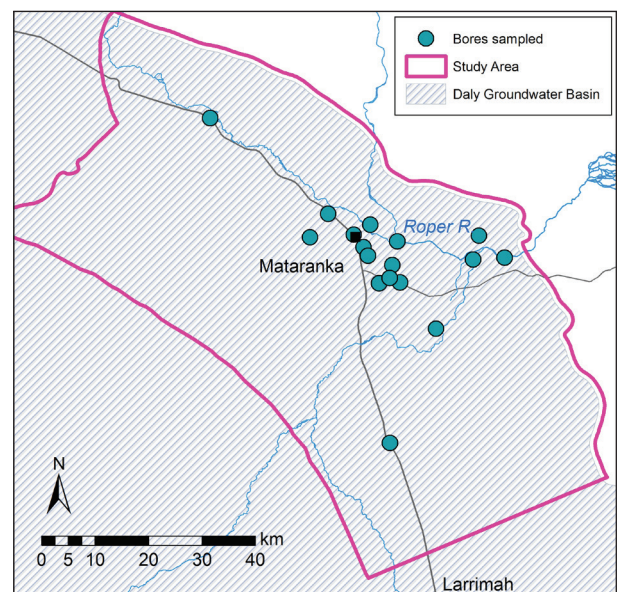
This survey was the last in a rolling program to test aquifers in the Katherine, Darwin, Ooloo and Mataranka areas.

What was tested?

18 bores in the Tindall aquifer in the Mataranka region were tested for their chemistry, nutrients and over 150 pesticides and common chemical contaminants.

A range of land uses were represented, including:

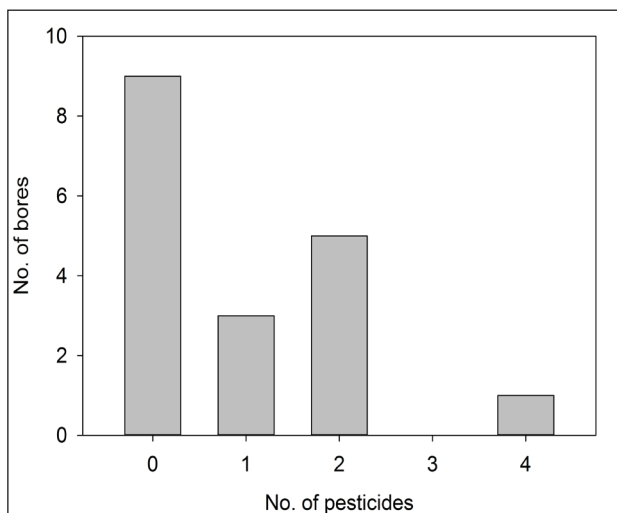
- irrigated agriculture
- National Parks and
- cattle grazing.



Study area

What did we find?

Six pesticides were detected during the survey with 30% of bores containing traces of at least one pesticide. With the exception of one pesticide in one sample, concentrations in all samples were 100 to 1,000 times below environmental guideline values.



Number of pesticides found in individual bores

The pesticide that exceeded guideline values is no longer in use in Australia. It is likely to be a legacy from historical use.

Nitrate concentrations differed widely between bores, ranging from 0.004 to 1.5 mg/L.

Irrigated agriculture was associated with the highest levels of pesticide contamination and the highest nitrate concentrations. However, elevated nitrate was also present in undeveloped non-agricultural areas in the southern part of the aquifer with no apparent cause to explain the high levels.

Other nutrient levels were mostly very low and similar throughout the aquifer. This means they are unlikely to originate from localised human activities (e.g. septic tanks or fertiliser application).

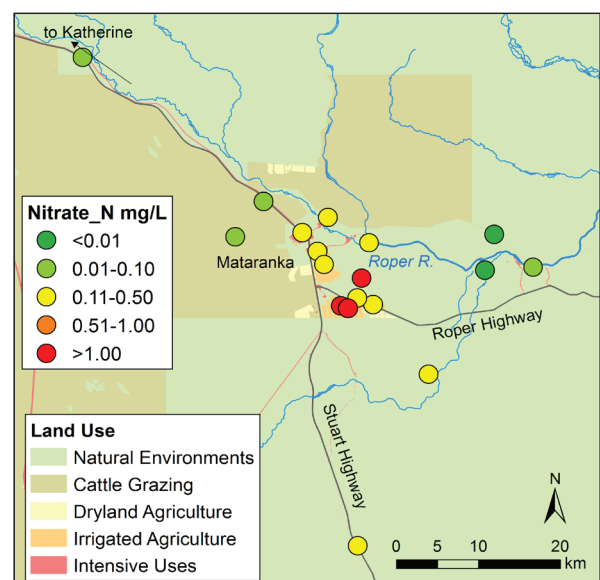
What does it mean?

The results of this study show that chemical contamination levels in the aquifer are currently extremely low and will not have a detrimental effect

on the river's ecosystems when the groundwater enters the river. This is supported by monitoring of the Roper River and its tributaries in the dry season.

Nevertheless, they act as a reminder that it is important to adhere to best practice in the storage and application of chemicals.

The findings are similar to previous studies in other Top End regions and provide a baseline for future monitoring.



Nitrate concentrations in the Mataranka area

More information

The full report is available at www.denr.nt.gov.au/water-publications

If you have any questions about the study, please do not hesitate to contact the project leader, Julia Schult, on 08 8999 4405 or email Julia.schult@nt.gov.au.



For more information contact Water Resources:
Darwin: 08 8999 3632
Katherine: 08 8973 8834
Alice Springs: 08 8951 9215
E: waterresources@nt.gov.au
www.nt.gov.au/water

Mataranka - Tindall Limestone Aquifer Water Allocation Plan

Modelling Water Budget

Des Yin Foo

Water Resources Division

13 March 2019

www.nt.gov.au



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- Hydrogeology and Hydrology
- Roper Surface Water System
- Integrated Water Resource Modelling
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 - Rainfall and Recharge
 - Change in Groundwater Storage
 - Evapotranspiration
 - Inflow and Outflow
 - Water Balance
- Modelled Annual Recharge

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Hydrogeology and Hydrology

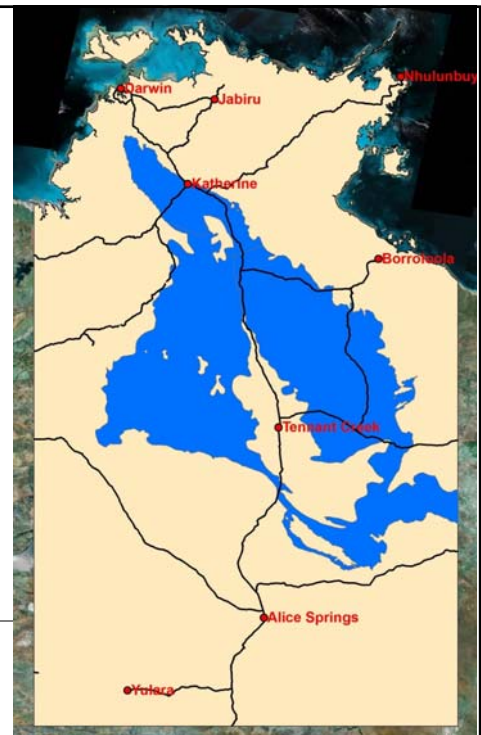
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The Cambrian Basins

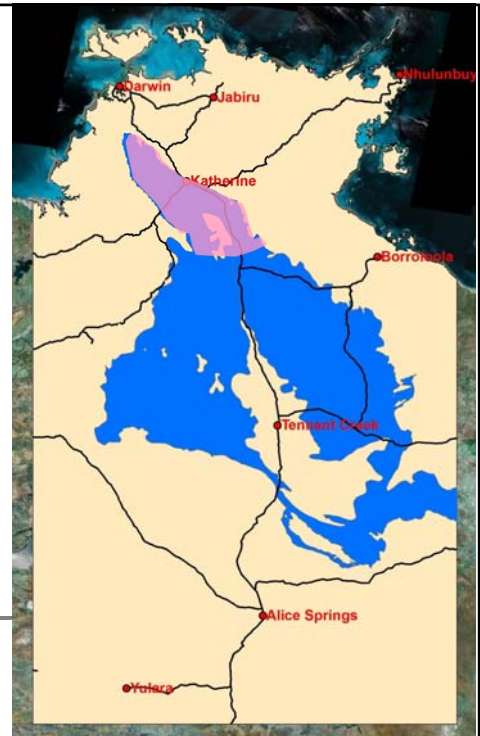
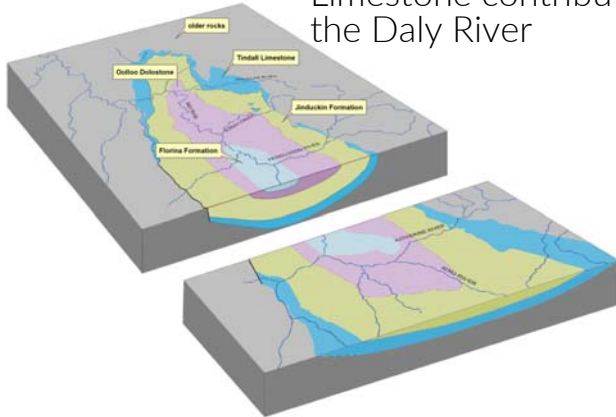
- Daly
- Wiso
- Georgina

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Daly Basin Aquifers

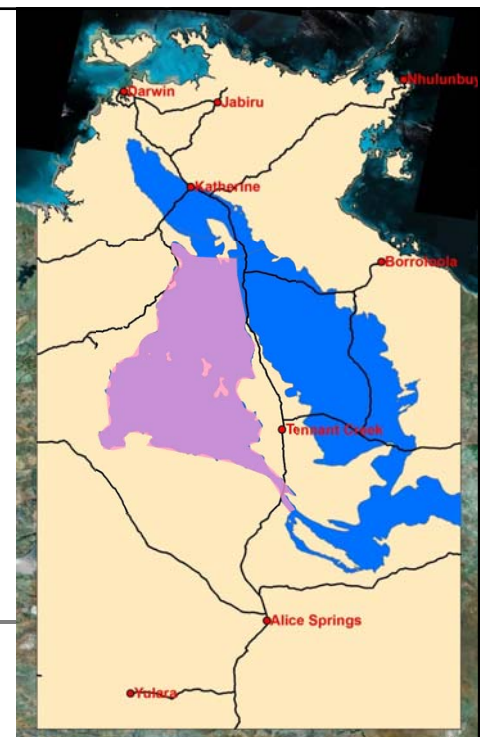
- **Deep** multi-layered sedimentary basin
- Two significant aquifer systems
- Ooloo Dolostone and Tindall Limestone contribute to flows in the Daly River



Wiso Basin Aquifers

- Single-layered system over shallow basement
- Tindall Limestone constitutes only aquifer
- Tindall Limestone source of flow in the Flora River
- Basement topography critical in groundwater flow path

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Georgina Basin Aquifers

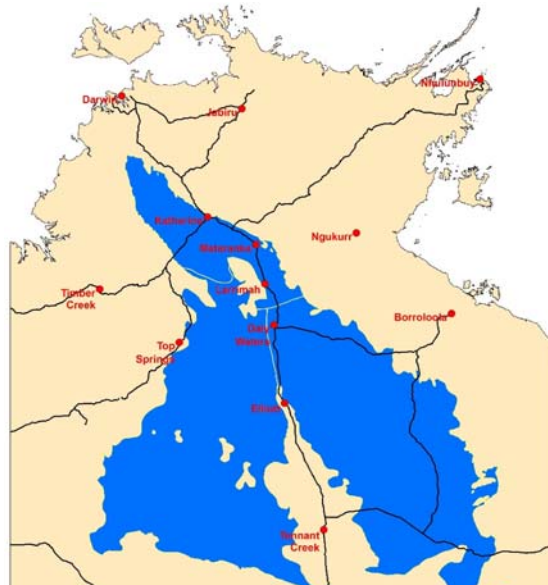
- Multi-layered deep system
- Gum Ridge Formation / Tindall Limestone source of flow in the Roper River
- Anthony Lagoon Formation and other younger sediments overlie the Gum Ridge
- Water quality different in the aquifers – best quality water in the Gum Ridge
- Recharge non-seasonal south of Daly Waters

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The Cambrian Basins

- Daly
- Wiso
- Georgina

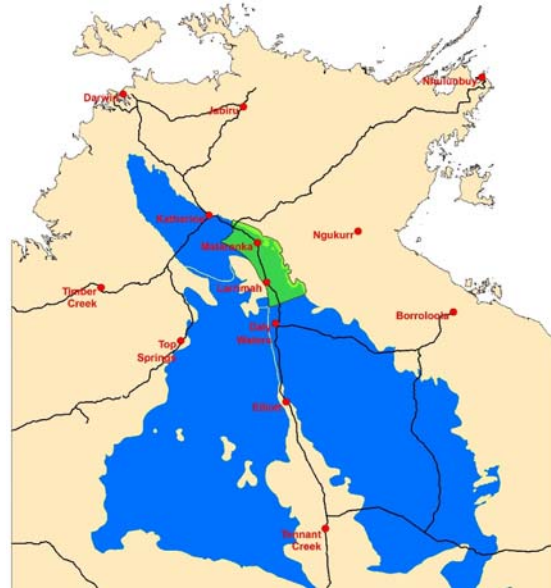


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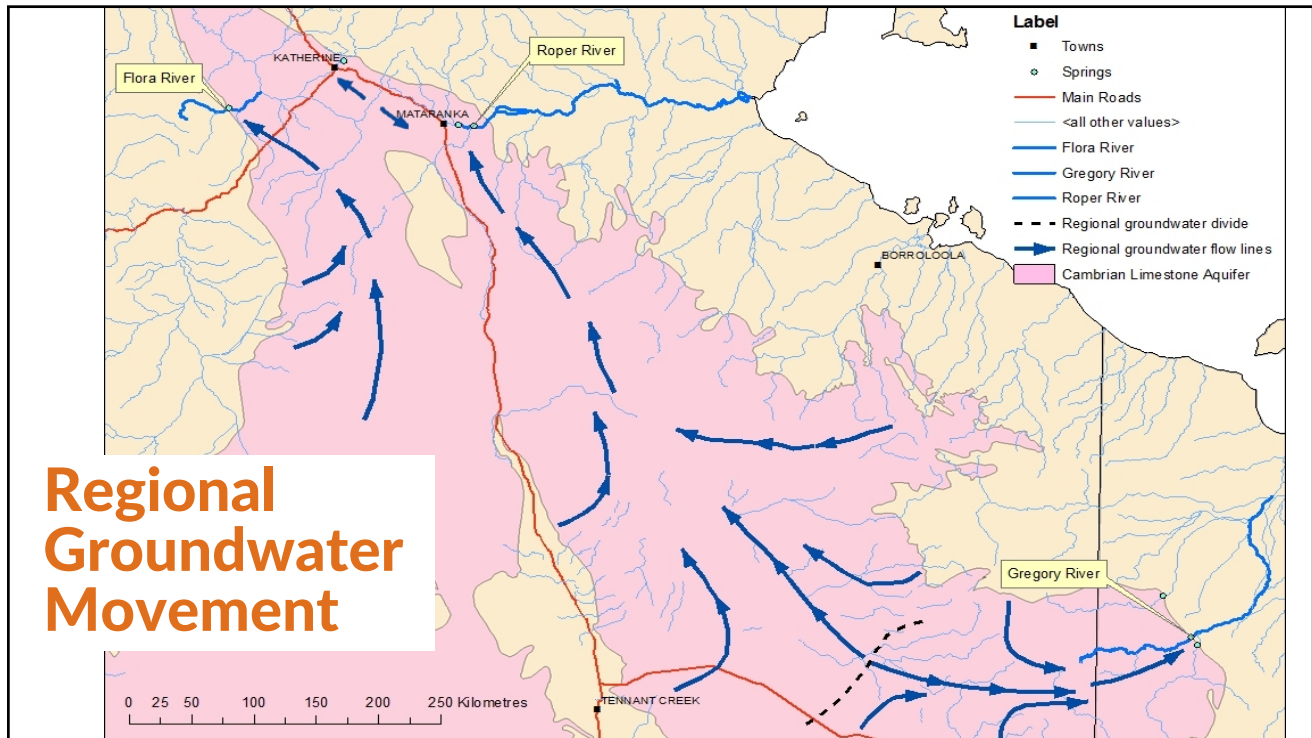


The Cambrian Basins

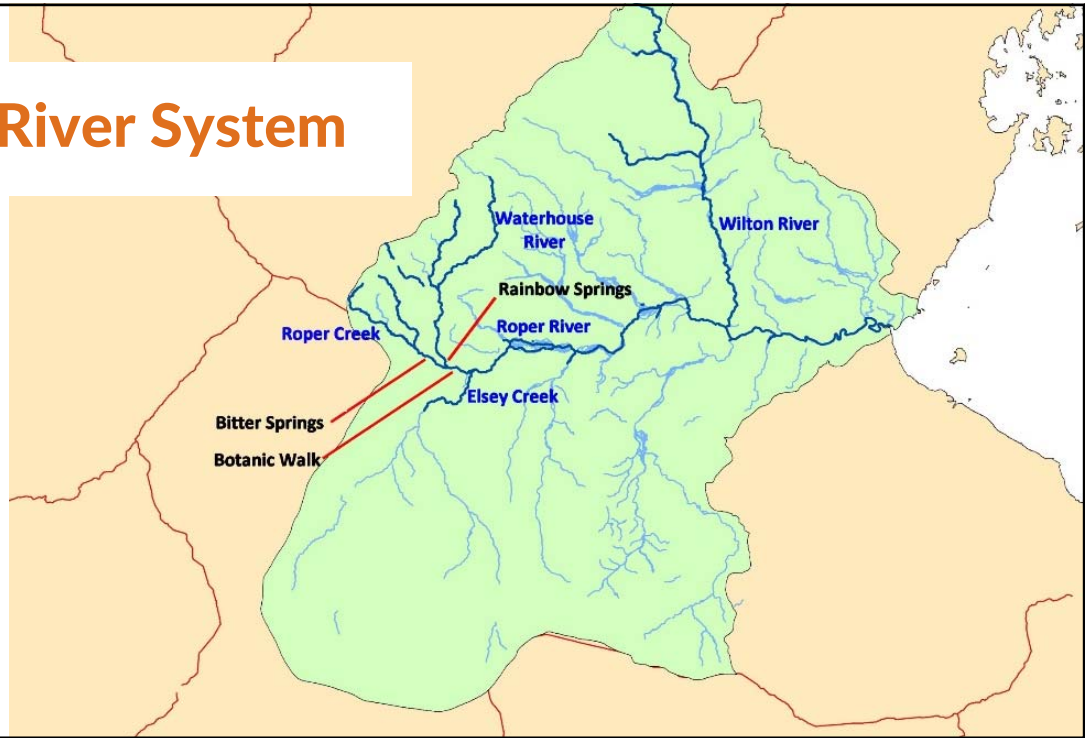
- Daly
- Wiso
- Georgina



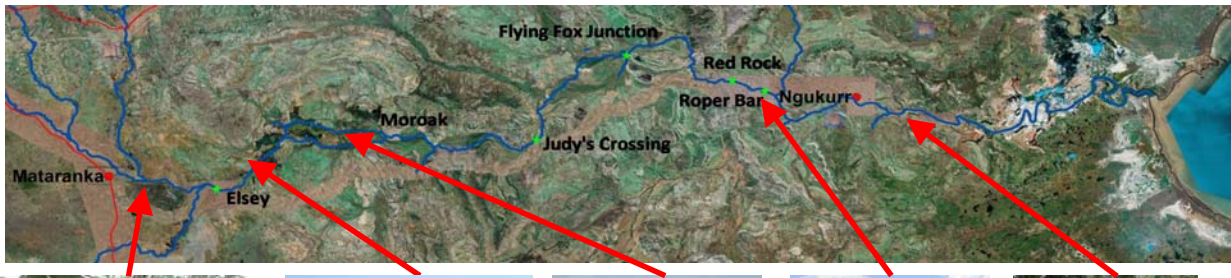
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Roper River System



The Various Reaches of the Roper River



Rainbow Springs



Red Lily Lagoon



Braided Section

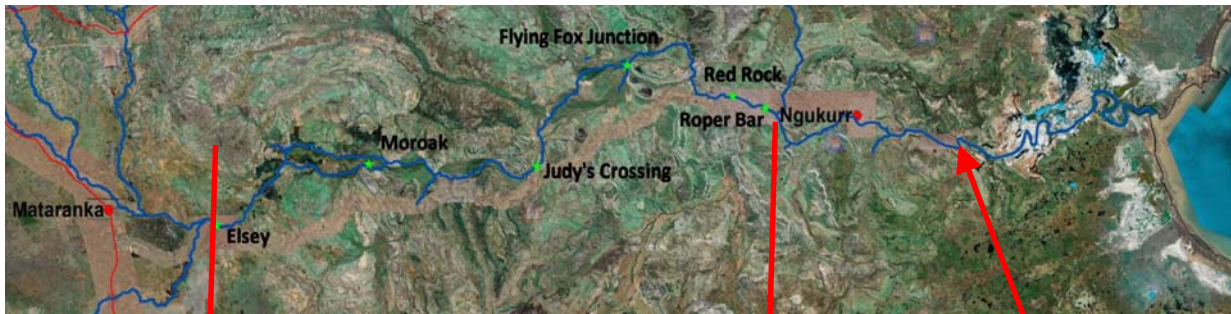


Roper Bar



Roper Pool at
Ngukurr

The Various Reaches of the Roper River



2.5 m³/s reduction
in flow

In dry periods
there can be little
or no flow at
Roper Bar

Kangaroo Island

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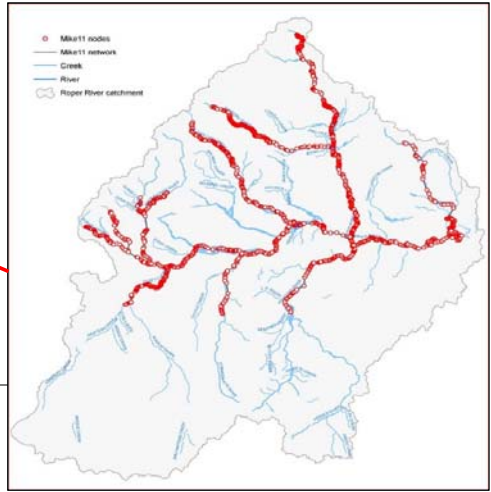
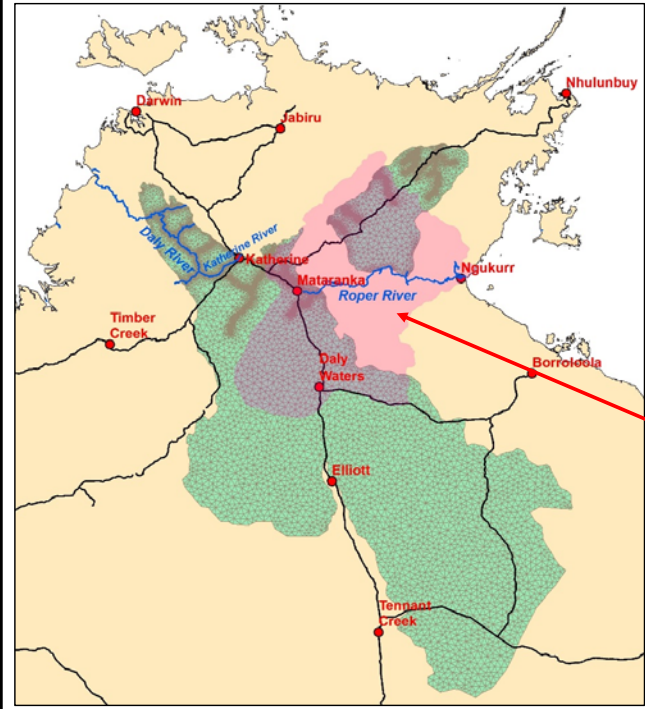


Tindall Limestone Modelling in the Roper Region

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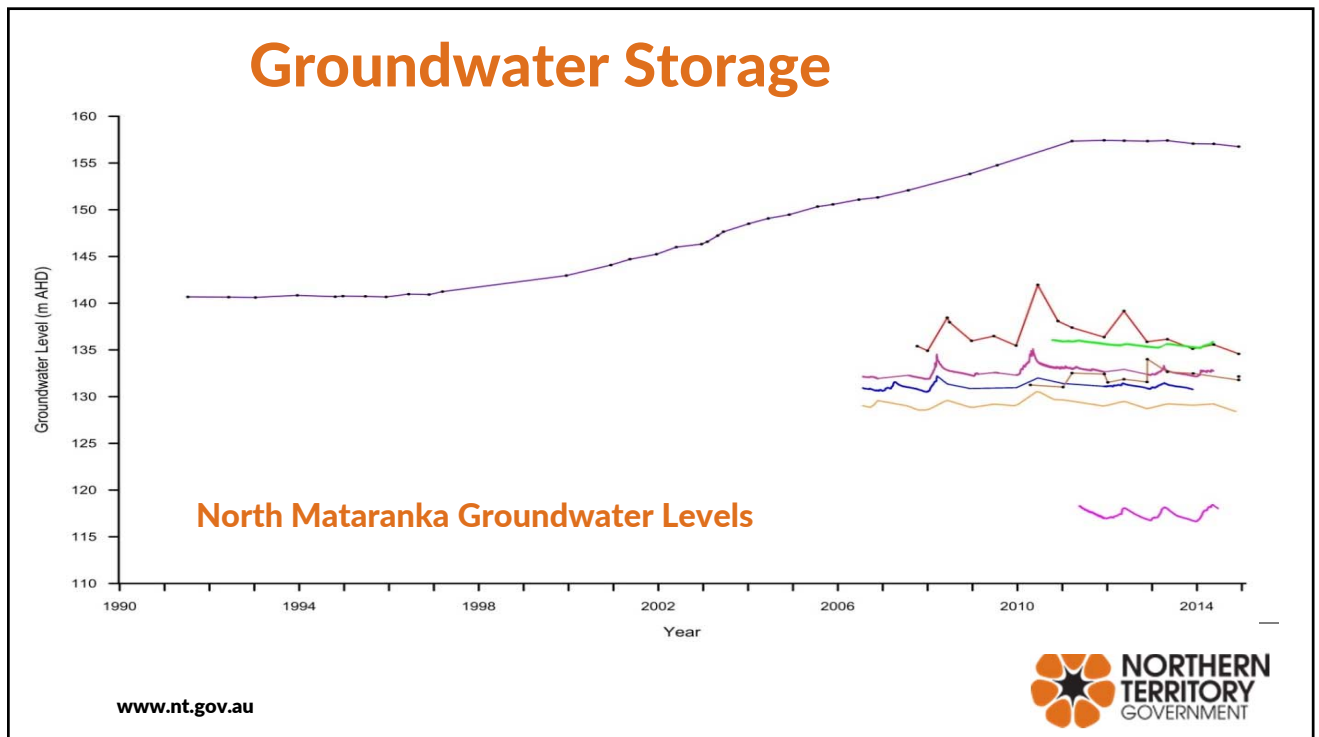
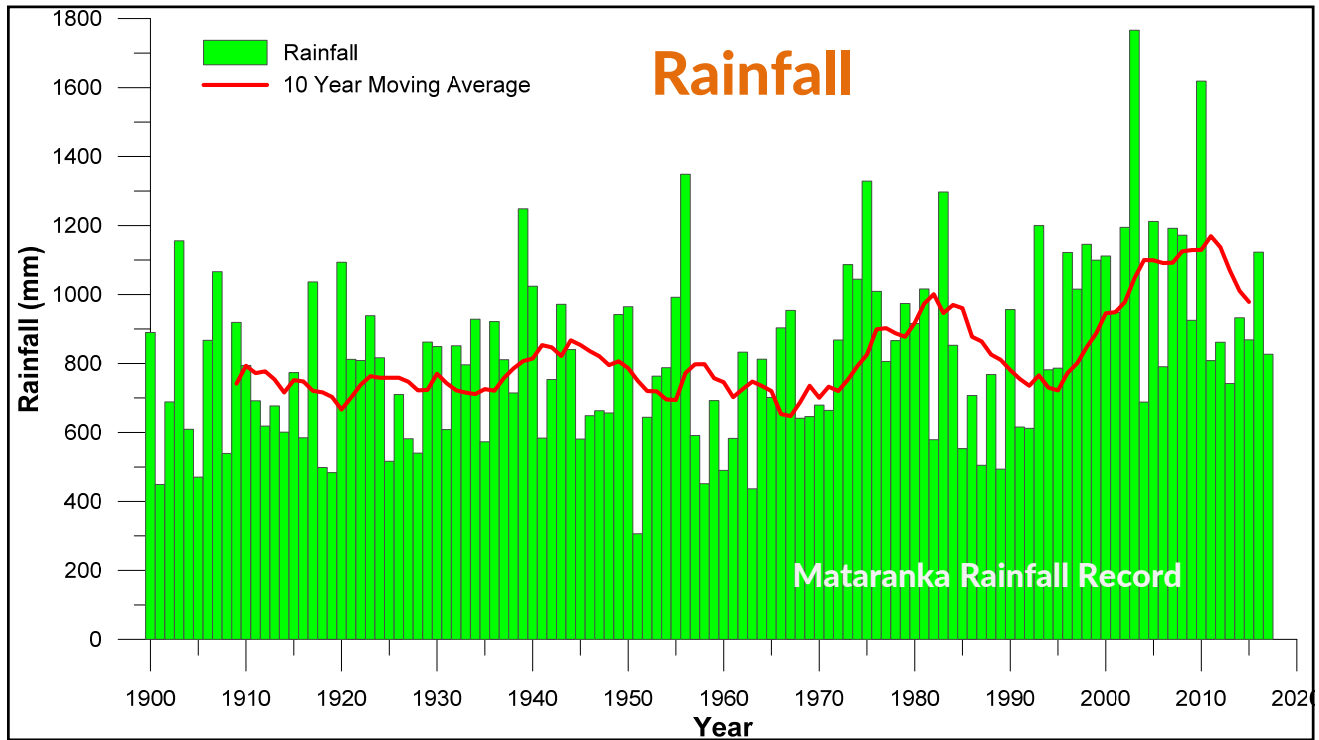
Integrated Model of the Tindall Limestone and the Roper River

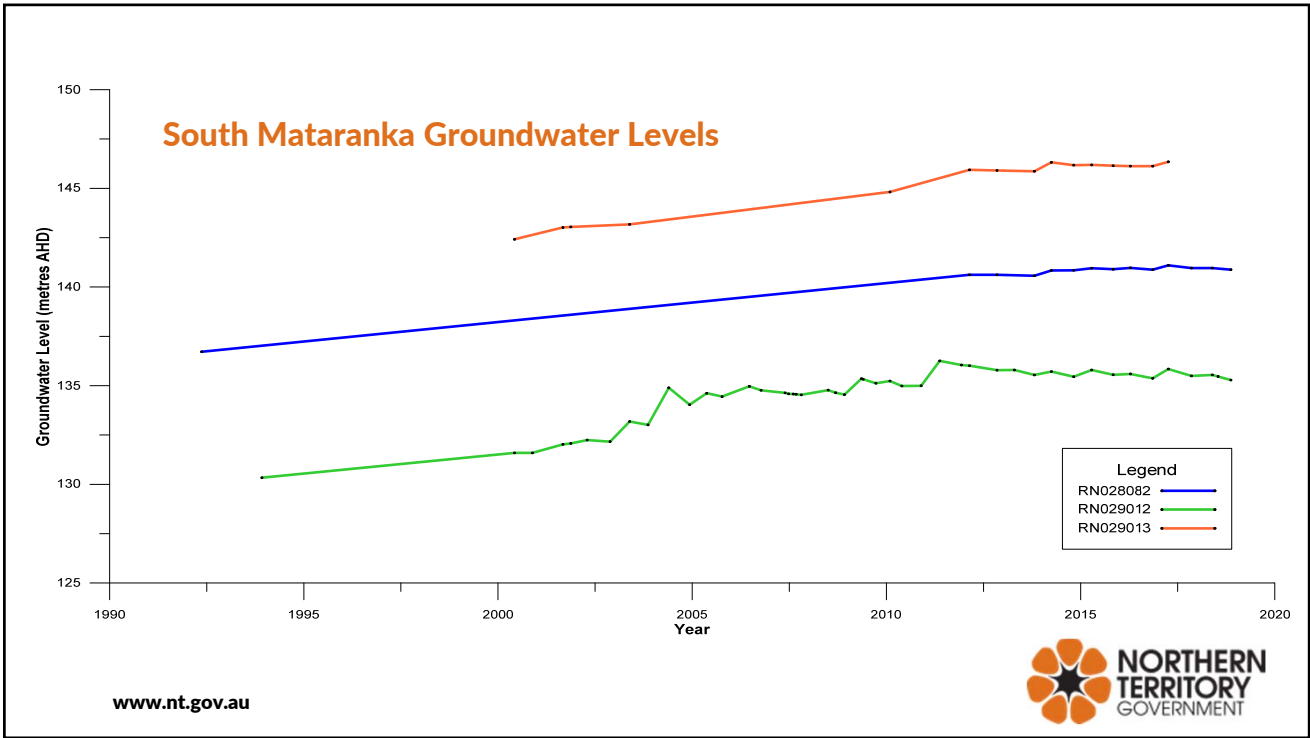


Water Balance

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Inflow and Outflow

Inflow – relatively low

- North-west area near King River
- Georgina Basin

Outflow – mostly resulting from groundwater recharge

- Discharge into the Roper River through the river bed and springs

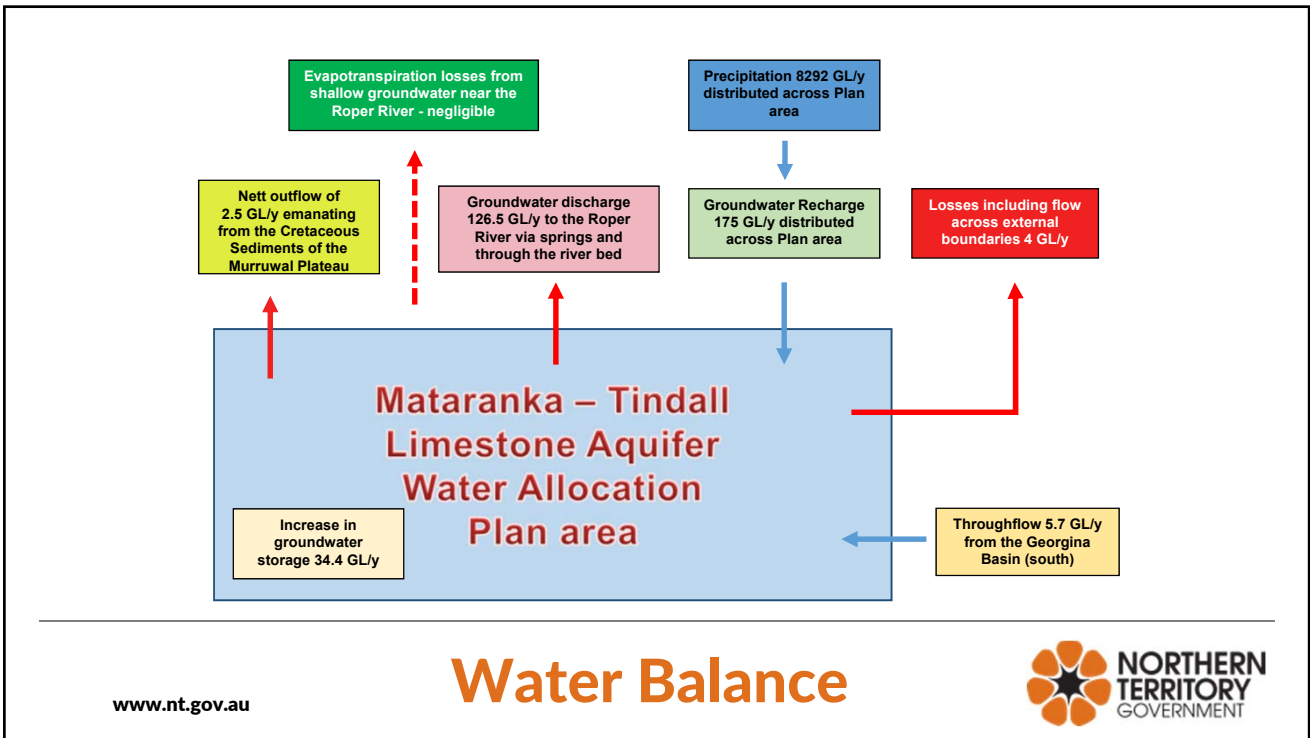
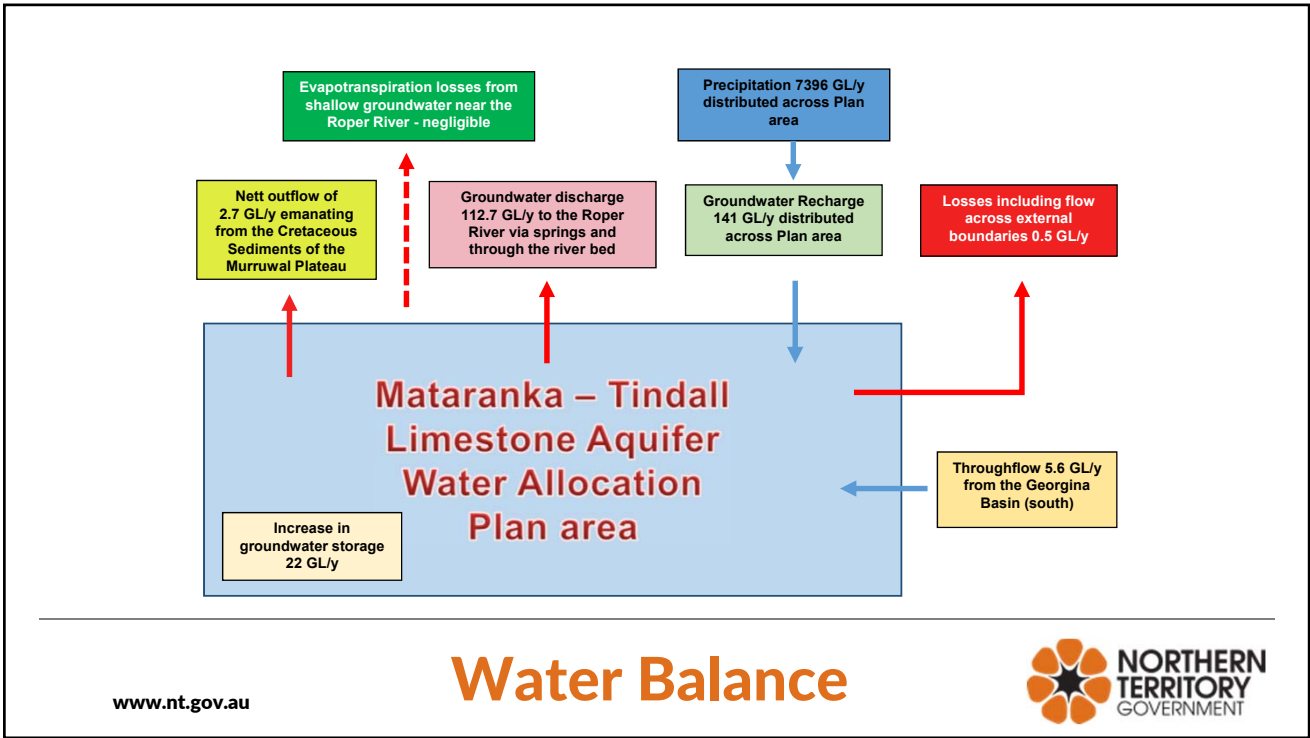
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Plan Area Water Balance

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Modelled Annual Recharge

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Plan Area Modelled Recharge 1900 - 2018

Average	181 GL/y
Median	141 GL/y

Plan Area Modelled Recharge 1960 - 2018

Average	222 GL/y
Median	175 GL/y

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