

**Tindall Mataranka to Daly Waters Water Advisory Committee**  
*Meeting Record 7*

*25 October 2018 – 10.00 am*  
*Mataranka Community Hall*

**Members Present**

Rebecca Mohr-Bell  
Sarah Kerin  
Sharon Hillen  
Tim Helder  
Vin Lange  
Justin Dyer  
Clair O'Brien  
Ben Lewis

Independent Chair  
Department of Tourism and Culture  
Roper Gulf Regional Council  
Proxy for Quintis, Water Extraction Licence Holder  
Centrefarm / TopEnd Farm  
Proxy for NT Cattlemen's Association  
Regenerative Agriculture  
Proxy for Allister Andrews, Jawoyn Association

**Members Absent**

Kane Younghusband  
David Ciaravolo  
David Crook  
Helena Lardy  
Jocelyn James  
Kerry Roberts

Horticulturist, Water Extraction Licence holder  
Amateur Fishermen's Association of the Northern Territory  
Resigned - Aquatic Ecologist, CDU  
Jilkminggan Community Aboriginal Association  
Jilkminggan Community Aboriginal Association  
Jilkminggan Community Aboriginal Association

**Advisors Present**

Tim Bond  
Michelle Rodrigo  
Peter Dostine

Director Water Planning and Engagement, DENR  
Water Planner, DENR  
Aquatic Scientist, Aquatic Health, DENR

**Observers**

Pru Ducey  
Rohan Leach  
Rick Fletcher

DENR - Minutes  
NT Cattlemen's Association  
Northern Land Council

## 1. OPENING (Chair)

Meeting opened at 10.00am. Welcome and round table introductions.

### 1.1. Apologies

David Ciaravolo	Amateur Fishermen's Association of the Northern Territory
David Crook	Aquatic Ecologist, CDU
Helena Lardy	Jilkminggan Community Aboriginal Association
Kerry Roberts	Jilkminggan Community Aboriginal Association
Jocelyn James	Jilkminggan Community Aboriginal Association

It is noted that arrangements have been made for the Water Planner (Michelle) and Director (Tim) to visit Jilkminggan immediately after this WAC meeting to discuss the agenda items with members.

### 1.2. Membership and proxies

The Committee needs to be re-established by the Minister under a formal 'instrument' of appointment

- DENR will be gather full names and postal addresses from all members to include in the instrument
- Proxies need to confirm their ongoing position with the committee, including whether they intend to be put forward as the primary member.

Committee suggested approaching NT Farmers for nominations to replace Kane Younghusband.

Vin Lange requested consideration be given to formal appointing Rick Fletcher from NLC to the Committee, and retain Vin Lange as the representative from Centrefarm.

## 2. MINUTES OF MEETING 6 (Chair)

Draft Minutes of Meeting 6 held 21 August 2018 were emailed to members and proxies on 12 October 2018.

- ❖ **DECISION:** The Committee agreed that the Minutes of Meeting 6 held in Mataranka 21 August 2018 are a true and correct record.

## 3. BUSINESS ARISING FROM THE MINUTES (Chair)

Responsibility of	Action	Status
Michelle Rodrigo	Email members a copy of the presentations from Meeting 3 with the draft Minutes of Meeting 4	To be confirmed and resent if needed
Michelle Rodrigo	Check for the most up to date draft of each policy and re-send to all members	COMPLETED
Members holding a Water Extraction Licence  Chair	Those with direct experience in dealing with letters about unused water, to make a list of reasons and send them to the Chair. The Chair will then update the dot points and recirculate to the Committee.	COMPLETED Meeting 6
Michelle Rodrigo	Send members an Information Sheet about this year's groundwater quality survey and a weblink to previous published reports - <a href="#">Water Quality of the Roper River 2012-2016</a> .	COMPLETED Refer also to Agenda Item 7 this meeting
Members  Chair	All members to email comments on the proposed Objectives to the Chair. The Chair will collate these comments and circulate to the rest of the Committee.	COMPLETED For discussion at Agenda Item 5 this meeting

<b>Responsibility of</b>	<b>Action</b>	<b>Status</b>
David Crook	Circulate a presentation given by Dr Alan Andersen (member of fracking inquiry panel) on the outcomes of the inquiry	<b>COMPLETED</b> 28/6/2018
Rebecca Mohr-Bell & Michelle Rodrigo	Assess WAC progress, clarify information needs and define a clear focus for upcoming meetings.	<b>COMPLETED</b> Meeting 6
Michelle Rodrigo	Liaise with Committee to arrange meeting to update Jilkminggan members	<b>Ongoing</b> Met with members 21/8/18 Visit scheduled for 25/10/18
Rebecca Mohr-Bell	Write to the Controller regarding consideration of licence applications during the development phase of a WAP (see Meeting 6 minutes for details). Draft letter will be circulated to the Committee	<b>COMPLETED</b> Copy of letter circulated. No response received as yet.
Michelle Rodrigo	Seek permission to share notes from the discussions with Jilkminggan and circulate to the Committee <ul style="list-style-type: none"> <li>Members from Jilkimnggan agreed to notes being shared but have not yet approved notes from the meeting. Will be combined with notes from today's meeting and attached to the minutes.</li> </ul>	<b>Ongoing</b>
Sharon Hillen	Provide the Chair and Planner with dates for local management meetings.	<b>COMPLETED</b> Email received 25/10/18
Michelle Rodrigo	Look at evidence of discharge zones in the Roper <ul style="list-style-type: none"> <li>More work is needed to determine where discharge zones are, and to develop scenarios for buffer zones</li> </ul>	<b>Ongoing</b>
Michelle Rodrigo	Planner to get meeting papers out well before the meeting to allow members time to absorb and consider information	<b>Ongoing</b>
Michelle Rodrigo	Try to program in a session on climate change scenario and how this might be incorporated into scenario modelling <ul style="list-style-type: none"> <li>Suitable presenter not yet identified. DENR Water Assessment team is doing some analysis of likely climate trends; early indication are that that changes for Mataranka region are not likely to be substantial and not discernible by the models.</li> </ul>	<b>Ongoing</b>
Tim Bond	Provide a link to information on the Roper Valley Iron Ore Project. <a href="https://ntepa.nt.gov.au/environmental-assessments/register/roper-valley-iron-ore-project">https://ntepa.nt.gov.au/environmental-assessments/register/roper-valley-iron-ore-project</a>	<b>COMPLETED</b> 29/08/18
Michelle Rodrigo	Provide a summary of licence applications for the bigger region <ul style="list-style-type: none"> <li>Guidelines are being developed for the Licensing and Regulation team in relation to applications received in the absence of a Water Allocation Plan</li> <li>Vin Lange requested it be minuted that from a traditional owner and native title claimant perspective, the process is better than before, but far from perfect.</li> </ul>	<b>COMPLETED</b> Also for discussion at Item 8 in this meeting

#### 4. NEW WATER ALLOCATION PLAN BOUNDARY

(Planner)

Members were provided with the Information paper at Appendix 1.

Discussion of implications of the boundary change:

##### Plan Area

- The boundary change reduces the total land area within the Water Allocation Plan.
- A water balance is being developed for the new area; includes throughflow from the south (Georgina Basin) into the WAP area (Daly Basin), although this flow is very slow and relatively small.
- Beetaloo sub-basin WAPs and the Mataranka WAP will show linkages between the two plans
- Need to ensure that throughflow from the Georgina Basin into the Daly Basin is maintained and accounted for appropriately in management arrangements, ESY values, etc.

##### Plan and Committee names

- As part of re-establishing the Committee under an instrument of appointment, a new Plan name (*Mataranka-Tindall Limestone Aquifer Water Allocation Plan*) will be put forward to the Minister.
- The Committee name may also change – to be confirmed.

##### Implications for resource assessment and water sharing

- Discussion of how values for Estimated Sustainable Yield (ESY) and the Consumptive Pool are developed, including the contingent 80:20 rule under the NT Water Allocation Planning Framework. Part of the WAC's role is to advise the Minister and Controller on what is an acceptable ESY.
- Discussion of the link between groundwater and surface water and the equivalence of surface water to groundwater during dry season baseflow periods i.e. extraction from the Roper River during the dry season is the equivalent of extracting from a bore.
- At the end of the dry, we shouldn't be influencing the flow at Elsey, for example.
- Wet season flows are as important as dry season flows
- The Plan will treat river flows at the end of the dry season as groundwater.

The WAC is not being asked to make a decision in relation to an agreed ESY as yet. More work needs to be done on the water balance/resource assessment before a final recommendation can be made. The purpose of discussing ESY at this meeting is to think about the principles that should be applied to determining the ESY. For example, 'What climate period should be used?...Should 'average' or 'median' recharge values be used?...What do we want to achieve with environmental and cultural flows?

*What is the timeline for additional modelling?* Recommendations about management zones need to be settled first, so that modelling can be done for each zone.

The Committee would like to see further modelling before agreeing to the time period to be used for estimating average annual recharge and requested more information about the implications of using 'average' or 'median' values.

The Committee's preference is to wait for more certain figures about recharge, discharge etc. so that the discussions don't need to be revisited if these figures change after the model is re-run. These figures should be made available to the Committee as soon as possible.

Water balance figures, especially recharge, are important determinants of the ESY. In other Plans, the Committee has also considered the reliability and security outcomes they want from resource allocations – the less water allocated, the more reliable and secure the supply will be for users.

The change to the Plan boundary has no current implications for licence holders (or applicants). There are no water licences or applications in the Daly Waters area that will be affected.

#### Implications for Strategic Aboriginal Water Reserve (SAWR)

The reduction of total Plan area may lead to a proportional increase in SAWR in some management zones. Once the management zones are settled, Water Resources Division will re-assess the area of land entitled to allocations under the SAWR. An update will be presented to the WAC at the next meeting.

Main take-away messages from Item 4 discussion:

- no current licences (or applicants) are cut out of the Plan area as a result of the change to the boundary
  - the portion of SAWR may increase in some management zones
  - don't speculate on water resource volumes, as these are yet to be confirmed
- ❖ **ACTION** – Members to advise DENR of any other implications they think may arise as a result of the changes to the Plan area.
  - ❖ **ACTION** – the Department is to update the spatial mapping and figures on Aboriginal land eligible for SAWR in the new WAP area and Michelle will present this to the WAC at the next meeting.
  - ❖ **ACTION** – When data is available, add a layer to the Plan area map, showing eligible Aboriginal land in relation to the SAWR.
  - ❖ **ACTION** – For future meetings, restrict layers on maps to those that are relevant to the discussion e.g. distinguish eligible Aboriginal land from other 'freehold' land for the purposes of discussing SAWR allocations.

## 5. PLAN OBJECTIVES

(Planner)

Members were provided with the Information Paper at Appendix 2 and a presentation (Appendix 3).

### Objectives

The Committee has contributed to the drafting of four key Plan Objectives. For these to 'fit' into the framework for a Water Allocation Plan, these statements will now be known as Outcomes (Appendix 2 - refer table on page 3 of the Objectives Framework paper). Objectives describe the things we will do in the WAP to achieve the desired Outcomes.

### Vision

*The waters of the Mataranka Tindall Limestone Aquifer are shared between all users in a sustainable, reliable and equitable manner while maintaining environmental flows in the Roper River and surrounding groundwater dependent environments*

The WAC was asked to critique this vision statement, and provided the following feedback:

- the statement summarises reasonably well what the Committee has discussed previously
- noted that the statement doesn't specifically mention 'springs'
- statement is suitably short and slick
- wording, as written above, is accepted by the Committee

### Management Principles

- these describe how we wish to go about making decisions i.e. guidelines for decisions
- the principles also provide guidance about the priority importance of the Plan Outcomes

### Outcomes

- Outcome 1 is fundamental to achieving the other outcomes. This needs greater emphasis, which, in part, is addressed by the following management principle:  
*‘Meeting the water needs of the environment, cultural practices, regional towns and communities, recreation activities, tourism operations, pastoral stations and Aboriginal economic development are priorities under this Water Allocation Plan, followed by those of water consumptive industries such as irrigated agriculture, mining and petroleum’.*
- Outcome 4(a) – the word “equitable” is ambiguous; what is fair to one person may not be fair to another person. Change wording of 4(a) to “enabling *water allocations to responsible and productive water consumptive industries* such as agriculture and tourism, while avoiding detrimental impacts on environmental and cultural values.
- Management Principles needs to incorporate something about facilitating the best use of the resource
- The WAP should eventually facilitate a licence application process that is not so onerous that it discourages applications or curtails development unnecessarily.

Minor revisions were made to the Outcome statements accordingly.

#### Revised Outcomes

1. The Tindall Limestone aquifer, and its connected surface waters, continue to maintain the ecological integrity of aquatic and associated terrestrial ecosystems and dependent cultural, recreational, and social values within the Plan area, including those downstream ecosystems which are highly dependent on Roper River flows from the Plan area.
2. Cultural flows and culturally significant water-dependent sites which are essential to sustaining traditional Aboriginal land use and cultural practices are protected from the potential impacts of groundwater extraction in the Plan area.
3. Towns, communities and rural properties have access to a quality, reliable water supply for domestic and visitor consumption (including downstream communities dependent on baseflow contributions from the Plan Area), and provision is made for current and future stock watering requirements.
4. Sustainable management of the Tindall Limestone aquifer and connected surface flows is supporting the region’s economic development by:
  - a) enabling water allocations to responsible and productive water consumptive industries such as agriculture and tourism, while avoiding detrimental impacts on environmental and cultural values.
  - b) supporting commercial development opportunities on Aboriginal lands in the Plan area through implementation of the Strategic Aboriginal Water Reserve.

- ❖ **ACTION** – When the Committee reviews the final version of the Plan, they will revisit the Vision and Outcomes (once other decisions have been made).
- ❖ **ACTION** – Planner will develop the Outcomes/Objectives table further and come back to the Committee with a more advanced version.

## 7. INFORMATION SESSION – UPDATE ON ROPER RIVER FISH MANAGEMENT STUDY (Peter Dostine, Aquatic Health Unit, DENR)

Presentation slides are at Appendix 4.

Preliminary conclusions of the project:

- High individual variability in movement patterns
- Low migration rates (in low flow years?)
- Spawning migration on flood pulses
- Most movement occurs within ~ 40 days of start of flow
- Threshold for downstream movement across Roper Bar ~ 50 cumecs
- No upstream migration of year 1+ fish tagged in estuary
- River mouth critical spawning habitat

Questions & discussion:

- *What is meant by 'subsides'?* Movement of food sources (e.g. cherabin up the Daly) from estuary to freshwater supports the food web in the upper reaches of the river (like a 'sushi train'!)
- The tags being used have a lifespan of up to 4 years. Many tags have not met that expectation. There was a faulty batch of tags (most fish 60cm+). 200 fish were tagged.
- Receivers are visited twice a year to download data
- Batches of fish were tagged at 5 locations (red arrows on map – Appendix 4, pg.7)
- *Is there enough variability in data about fish stocks to determine water quality and flow requirements?* No, the project is monitoring migration of individual fish, not fish stocks.
- *Are there critical considerations this committee should consider?*
  - Ecological understanding is still developing, but preliminary results could be considered in management settings
  - Flood harvesting is a significant issue, could potentially impact fish movements if peak flows are compromised; timing of flood harvesting (early or late?) needs to be managed.
  - Nitrate levels in the waters need monitoring – nitrate is a plant nutrient so increased levels can cause more frequent algal blooms.
- *How long has water quality been monitored in the Roper?* Various parameters of water quality have been surveyed for a long time; insecticide/herbicide surveys are more recent. Committee would like a summary of what data is available. Risk of elevated nitrate from expansion of septic in the region. PowerWater may have some data on this.
- *Minimum threshold of 50 cumecs; does this mean there more fish movement at 250 cumecs?* The threshold is at the late wet. Significant drawdown might affect this.
- *Does upstream movement take 1, 2 or 3 months?* There is still a lot we don't know. 50 cumecs over Roper Bar equates to about 1m over the Bar.
- *Is there a way to report if you have caught a tagged fish?* Yes, 3 or 4 tags have been returned by fishers.
- *When reproductive fish arrive at the estuary, do you have data on what triggers the spawning?* David Crook, CDU, may be able to provide more information. Fish are cued into knowing the wet season is coming.
- *Do we know what determines whether a fish will thrive or not?* Timing and volume of flows may be important for breeding, but also to ongoing survival. Not enough is known about the environmental constraints on successful breeding and survival.

## 9. INFORMATION SESSION – TINDALL MATARANKA GROUNDWATER QUALITY SURVEY (Aquatic Health Unit)

Presentation slides are at Appendix 5.

*Is any groundwater contamination showing up in springs?* Springs were not sampled this year, so we don't know.

*Is this the only water quality sampling being done?* Yes, this Aquatic Health Unit program is the only one surveying potential nutrient contamination at the moment.

*In regards to onshore shale gas will you be doing any testing, and testing for anything in particular?* This will be handled through the Implementation Plan for the Hydraulic Fracturing Report. As part of this, the Strategic Regional Environmental and Baseline Assessment (SREBA) will look at groundwater quality, as well as levels of methane being released into environment. The SREBA will set environmental baselines to work from before gas production starts. A number of groups and departments are involved, and there is a 'taskforce' within government ensuring delivery of the Implementation Plan. Committee was referred to the Implementation Plan website <https://hydraulicfracturing.nt.gov.au/implementation-plan>

*Over the decades, have other water quality assessments taken place? Is there a central body of work or data, or are we just starting from scratch?* There has been data collected over several decades. This current sampling of bores is a more recent and targeted program, which is part of a much broader program of groundwater quality surveying across the Daly Roper Beetaloo Water Control District.

- ❖ **ACTION** – 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.

For the WAP planning process, the key thing is to see whether there is a link between changes in water quality and allowing access to water.

*Have any investigations been done in relation to septics in Mataranka? What bores around Mataranka have been tested for nitrates?* With some septics nearing 20-30 years old, Roper Gulf Regional Council is concerned that nutrients may be leaching into the groundwater system.

- ❖ **ACTION** – Sharon Hillen will 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.
- ❖ **ACTION** – Pru Ducey to check whether the Committee received a presentation on water quality (possibly from David Crook) at 2017 meetings.

The variation in groundwater quality across the Plan Area is further considered in the session below on Management Zones.

The Committee extended their thanks to Peter Dostine for attending the meeting and making the presentations.

## 10. FLOOD HARVESTING POLICY – MINI WORKSHOP (Tim Bond)

Slides from the presentation *Licensing Considerations for Surface Water Flood Harvesting* are at Appendix 6.

A record of the Committee's feedback provided during the workshop is at Appendix 7.

- ❖ **ACTION** – Circulate presentation slides and notes taken during the session to WAC members by 31 October 2018.

- ❖ **ACTION** – WAC members to provide any additional comments on Flood Harvesting by 16 November 2018.

## 11. MANAGEMENT ZONES AND SPRING PROTECTION AREAS (Planner)

Members were provided with the Information paper at Appendix 8, which includes a map of proposed management zones for the WAC's consideration – North Mataranka, South Mataranka and Larrimah. A large format version of this map was also available at the meeting to support the discussion.

The Committee's advice to use cadastral boundaries for management zoning has largely been followed so that individual properties are not split between different zones. Much of the boundary between north and south Mataranka zones, however, follows the river corridor as this delineates the differing conditions associated with groundwater north and south of the river.

At Meeting 6 the Committee discussed the rationale/principles for delineating management zones. This includes the differing chemical properties of groundwater in the north compared to the south, as well as the substantial difference in volume of groundwater discharge to the river between the north (75% of total discharge) and south (25% of total discharge). See Table 1 of Appendix 8 for a comprehensive summary of characteristics of each of the three proposed management zone.

*How do you see the consumptive pool being broken up between zones?* Recharge in a particular zone would be the primary determinant of the total Estimated Sustainable Yield in each zone. The Consumptive Pool will be a portion of this. Once a decision is made on zones, the water assessment team can undertake further work to confirm recharge, discharge, etc. values for each zone i.e. a water balance.

The Committee needs clearer figures before we can make decisions. As shown in Table 2 on page 4, we don't have the information yet to divide recharge between North Mataranka and South Mataranka.

The principles recommended by the Committee at Meeting 6 are shown on page 2 of Appendix 8. The main purpose of dividing the WAP Area into three management zones is to create a tool for managing the concentration of extraction points (bores), knowing that groundwater conditions are quite distinct in each zone.

Recharge in each zone will be the primary determinant of what might eventually be available for extraction in that zone.

Maintaining the natural level of 'mixing' of groundwater discharges from the north and south Mataranka zones is important – don't want to take only the better quality water and leave the poorer quality water for the river. We know the typical chemical properties of surface water in the dry season, so it is possible to assign a threshold to this and then monitor for change.

*Does the current/future demand for groundwater align with land suitability?* Most demand is currently in the proposed South Mataranka Zone, but the groundwater in the North Mataranka Zone is fresher.

Boundary between North Mataranka and South Mataranka zones needs more careful consideration than the boundary between South Mataranka and Larrimah zones.

- ❖ **DECISION** - The management zones proposed at this meeting (including mapping and rationale) are supported by the Committee, providing the Committee has another opportunity to review the zoning once water balance figures are available.

**12. KEY MESSAGES FROM THIS MEETING (Chair)**

Not discussed due to time constraints

**13. NEXT MEETING (Chair)**

Thursday 6 December 2018 in the Conference Room at Roper Gulf Regional Council, Katherine

If water balance information for each zone is not available by Thursday 22 November, the meeting will be changed to a teleconference.

**Meeting closed 14.56pm**

**14. NOTES OF POST-MEETING DISCUSSION WITH JILKMINGGAN MEMBERS (PLANNER)**

Immediately following the WAC meeting, DENR Water Planners, Michelle Rodrigo and Tim Bond, visited Jilkminggan Community to speak with WAC member Helena Lardy about the agenda items discussed during the day. Meeting started around 3.45pm.

The following topics were discussed:

**NLC support** – Helena was advised of correspondence with the NLC’s Rick Fletcher regarding support for the participation of Aboriginal people and communities in the Mataranka water planning process. Also discussed the WAC’s suggestion to create an additional position on the WAC for Rick Fletcher from the NLC Community Development Unit in Katherine. Helena was advised that Rick attended today’s WAC meeting in Mataranka as an observer.

**Proposed management zones** – the rationale behind the delineation of three management zones was discussed.

**Confirmation of the revised Plan boundary** – Helena reiterated concerns about potential contamination of groundwater as a result of fracking activities to the south of the Plan area, especially given the direction of groundwater flow from south to the north makes the Mataranka Plan/Roper River the receiving waters.

**Impacts of ferals** – horse and pig numbers need to be managed as they are causing a lot of damage to sensitive wetlands and riverbanks within the Plan area and in the greater Roper River region. Pig shooters are also a problem as they make it dangerous for local people to move around the area.

**Strategic Aboriginal Water Reserve** – details of the policy and how it might apply in the Mataranka Tindall WAP were discussed. Using maps, we looked at the likely distribution of eligible Aboriginal land across the WAP Area and noted that most of this land is in the South Mataranka Zone. We discussed the issue of enacting an SAWR in a near or fully allocated system, including that the reserve may begin as a notional one until such time as water can be returned to the consumptive pool e.g. through re-couping or licence retirement. Options for how water can be used under SAWR were also discussed e.g. for development on country or as a temporary trade with another licence holder. It was clarified that the government is not involved in determining the monetary value of a trade, and that this is negotiated between the SAWR rights holders and the interested party.

**Future meetings** – future WAC meeting dates were discussed, as was the possibility of more ‘out-of-session’ briefings with Jilkminggan members and with other Aboriginal stakeholder groups.

Discussion concluded around 5.15pm.

### Summary of Actions arising from TMDWWAC Meeting 7

Responsibility of	Action	Status
Michelle Rodrigo	Email members a copy of the presentations from Meeting 3 with the draft Minutes of Meeting 4	To be confirmed and resent if needed
Michelle Rodrigo	Liaise with Committee to arrange meeting to update Jilkminggan members	Ongoing Visit 21/8/18 Visit scheduled for 24/10/18
Michelle Rodrigo	Seek permission to share notes from the discussions with Jilkminggan and circulate to the Committee <ul style="list-style-type: none"> <li>Members from Jilkimnggan were happy for notes to be shared but have not yet approved notes from the meeting. Will be combined with notes from today's meeting (and attached to Minutes).</li> </ul>	Ongoing
Michelle Rodrigo	Look at what evidence there is of discharge zones in the Roper <ul style="list-style-type: none"> <li>More work is needed to determine where discharge zones are, and to develop scenarios for buffer zones</li> </ul>	Ongoing
Michelle Rodrigo	Planner to get meeting papers out well before the meeting to allow members time to absorb and consider information	Ongoing
Michelle Rodrigo	Try to program in a session on climate change scenario and how this might be incorporated into scenario modelling <ul style="list-style-type: none"> <li>Do not have anyone to present. Water Assessment are doing some work pointing to there not being any significant climate change that can be inputted to the models. The intensity of storms is difficult to put into the model.</li> </ul>	Ongoing
WAC members	Members to advise DENR of any other implications they think may arise as a result of the changes to the Plan area.	New
Michelle Rodrigo	The Department is to update the spatial mapping and figures on Aboriginal land eligible for SAWR in the new WAP area and Michelle will present this to the WAC at the next meeting.	New
Michelle Rodrigo	When data is available, add a layer to the map, showing eligible Aboriginal land in relation to the SAWR	New
Michelle Rodrigo	For future meetings, restrict layers on maps to those that are relevant to the discussion e.g. distinguish eligible Aboriginal land from other 'freehold' land for the purposes of discussing SAWR allocations.	New
WAC	When the Committee reviews the final version of the Plan, they will revisit the Vision and Outcomes (once other decisions have been made).	New
Michelle Rodrigo	Planner will develop the Outcomes/Objectives table further and come back to the Committee with a more advanced version.	New
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.	New

<b>Responsibility of</b>	<b>Action</b>	<b>Status</b>
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	New
Pru Ducey	Pru to check whether the Committee received a presentation on water quality (possibly from David Crook) at 2017 meetings.	New
Michelle Rodrigo	Circulate presentation slides and notes taken during the session to WAC members by 31 October 2018	New
WAC members	WAC members to provide any additional comments on Flood Harvesting by 16 November 2018.	New

### **Decisions TMDWWAC Meeting 7**

<b>Decision</b>	<b>Moved/Seconded</b>	<b>Status</b>
The Committee agreed that the Minutes of Meeting 6 held in Mataranka 21 August 2018 are a true and correct record.		<b>Unanimous</b>
The management zones proposed at this meeting (including mapping and rationale) are supported by the Committee, providing the Committee has another opportunity to review the zoning once water balance figures are available.		<b>Unanimous</b>

## Tindall Mataranka to Daly Waters WAC Meeting 7

25th October 2018

### Agenda Item 4 - New Water Allocation Plan boundary and implications for water sharing

#### *WAC Action required:*

- Note the information presented
- Discuss implications for the Plan and make any relevant recommendations

#### 1.0 Current situation

The boundary of the Tindall Mataranka to Daly Waters Water Allocation Plan (WAP) has been redrawn to eliminate overlap with future Beetaloo Sub-basin Water Allocation Plans. See map on Page 4.

The most notable change in the boundary alignment is along the southern edge which has been moved north towards Larrimah and now follows the geological boundary between the Daly and Georgina Basins.

Advice was sought on these changes from the Water Advisory Committee (WAC) during meetings held in June and August 2018. The WAC accepted the rationale for the changes, and recommended that the revised boundary follows known hydro-geological features (e.g. Daly-Georgina basins boundary) rather than cadastral ones (e.g. station boundaries). DENR executive have also considered the new boundary and the new alignment has been endorsed. The new boundary has been redrawn accordingly (map on Page 4).

#### 2.0 Plan Area

The redrawing of the boundary has reduced the total land area with the Water Allocation Plan to just over 57% of its original size.

Previous Tindall Mataranka to Daly Waters WAP Area	16206 km <sup>2</sup>
New Mataranka Tindall Limestone Aquifer WAP Area	9282 km <sup>2</sup>

#### 3.0 Plan and Committee names

The boundary change necessitates a change to the name of the Water Allocation Plan. The proposed title is ***Mataranka-Tindall Limestone Aquifer Water Allocation Plan 2019-2029***.

It is proposed that the name of the Water Advisory Committee remains unchanged as current members were appointed by the Minister under the name *Tindall Mataranka to Daly Waters Water Advisory Committee*.

The Minister is required to sign an instrument to affect the name change.

## 4.0 Implications for resource assessment and water sharing

Understanding the volume of recharge to the Tindall Limestone Aquifer within the Plan area is essential to making sound decisions about the sustainable management of the resource.

The amount of recharge (and discharge) in the Plan area helps us to determine the **Estimated Sustainable Yield (ESY)** of the resource, and then, using the *NT Water Allocation Planning Framework*, establish appropriate water sharing arrangements between non-consumptive (environment and cultural needs) and consumptive (public water supply, irrigated agriculture, stock and domestic etc.) beneficial uses.

A definition of Estimated Sustainable Yield (ESY) is not provided in the *Water Act (NT)*. A current working definition is:

The amount of water allocated to all beneficial uses, including the environment, for a defined water resource where the level of allowed water extraction or diversion does not compromise key cultural and environmental values, ecosystem functions, or the productive base of the water resource. Usually there is a **consumptive pool** identified as part of the estimated sustainable yield.

The ESY is used to provide for water resources to be distributed to non-consumptive and consumptive beneficial uses. This is important for ensuring that cultural flows, environmental flows and water-dependent ecosystems are maintained, for ensuring that water quality is suitable for identified 'beneficial uses' and for establishing the amount of water which can be allocated for drinking water and sustainable economic development. Once the ESY is determined and the environmental and associated cultural water requirements are established, the volume of water that can be allocated for consumptive use is derived, and a process for assigning the consumptive pool across different beneficial uses is undertaken, based on current use, predictions of demand and industry and economic development goals.

In the absence of directly related research, the *NT Water Allocation Planning Framework* provides the following guidance on water sharing for Top End Rivers and Aquifers (otherwise known as the 80:20 rule):

- Aquifers - at least **80% of annual aquifer recharge** is allocated as water for environmental and other public benefit water provision, and extraction for consumptive uses will not exceed the threshold level equivalent to **20% of annual recharge**
- Rivers - at least **80% of flow** at any time in any part of a river is allocated as water for environmental and other public benefit water provision, and extraction for consumptive use will not exceed **20% of flow** at any time in any part of a river

Groundwater resource assessment of the Tindall Limestone Aquifer in the Mataranka to Daly Waters region was completed in December 2015, providing guidance on the average annual recharge for the Plan Area.

Average annual recharge figures have now been recalculated for the new Mataranka-Tindall Water Allocation Plan Area. These figures are modelled outputs for the period 1960-2018 and should be regarded as a preliminary assessment only. Further work may be required, including on comparative figures for a longer climate period e.g. 1900-2018.

*Table 1: Comparative Plan Area Recharge Figures*

	PREVIOUS PLAN AREA	NEW PLAN AREA
Land area	16,206 km <sup>2</sup>	9,282 km <sup>2</sup>
<b>Recharge:</b>		
Average annual recharge	330 GL / year	218 GL / year
Median annual recharge		172 GL / year
Probability of equalling or exceeding average annual recharge in long term: a) based on 1960-2018 period b) based on 1900-2018 period		a) approx. every 2.5 years b) approx. every 3.3 years
Estimated non-consumptive use (80%)	264 GL / year	174.4 GL/year
Estimated consumptive pool (20%)	66 GL / year	43.6 GL /year
<b>Discharge:</b>		
Average annual discharge to the Roper		127 GL / year
Non-consumptive use (80%)		101.60 GL / year
Consumptive pool (20%)		25.4 GL / year

*Table 2: Comparative entitlement volumes*

	PREVIOUS PLAN AREA	NEW PLAN AREA
Total licensed groundwater entitlements	25.6 GL / year (25,625 ML/year)	25.6 GL/year (25,625 ML/year)
Total licensed surface water entitlements	0.062 GL/ year (60.2 ML/year) Note: extraction point for 32ML may be outside WAP	0.062 GL/ year (60.2 ML/year) Note: extraction point for 32ML may be outside WAP
Estimated unlicensed Rural Stock & Domestic use	2 – 3 GL/year (estimate)	1 – 2 GL/year (estimate)

All water extraction licences that were within the previous Plan area are located within the new (revised) Plan area.

There are no current groundwater or surface water licences in place (or under application) in the area which will now become part of the future Beetaloo South WAP area.

## 5.0 Implications for Strategic Aboriginal Water Reserve (SAWR)

Aboriginal land rights holders vested in the following land types are eligible to access the SAWR:

- Aboriginal land (scheduled under the Aboriginal Land Rights Act);
- Aboriginal land (NT enhanced freehold); and
- Exclusive Possession Native Title Determination Areas.

For the Tindall Mataranka to Daly Waters WAP area, the total area of eligible land was calculated to be 306,992.99 hectares, or 18.94 % of the total Plan area.

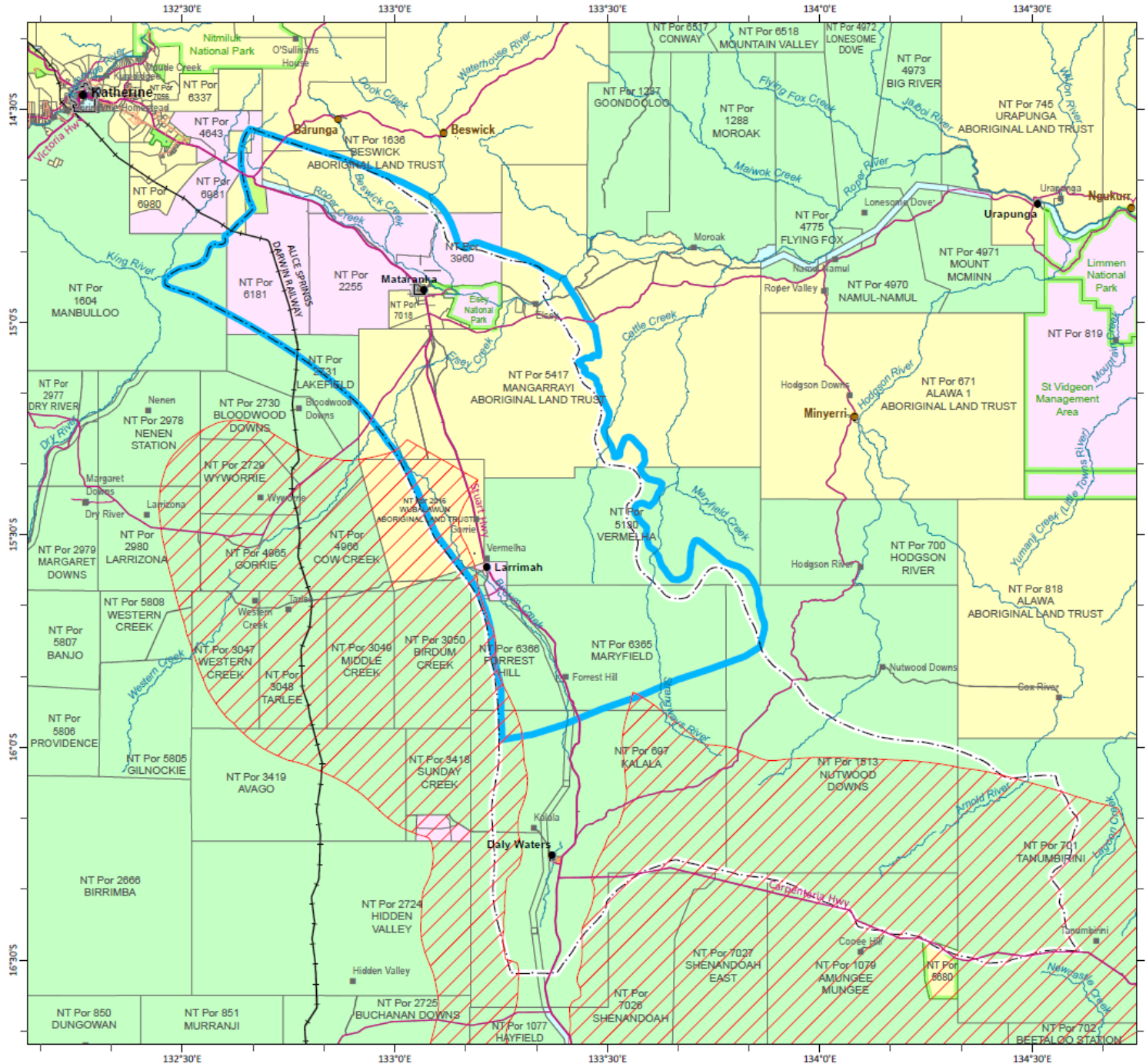
Under the new WAP area, the area of eligible Aboriginal land changes very little, but increases to approximately 30% of the total Plan area. The department is currently undertaking spatial mapping work to recalculate accurate figures for eligible Aboriginal land in the new WAP area, as well as for each management zone (when agreed).

Under the SAWR, if the area of eligible Aboriginal land with direct access to the water resources as a percentage of all land with access to the water resource in the Plan area (or zone) is 30% or greater, 30% of the available consumptive pool will be reserved for eligible Aboriginal rights holders. Access to the consumptive pool under the SAWR is capped at 30%.

Under a conceptual scenario where the Consumptive Pool for the entire Plan area is set at 20% of average annual recharge (Table 1) using the contingent 80:20 rule, and where the eligible SAWR entitlement is set at 30% of this pool, the volume reserved under SAWR would be 13.08 GL/year.

More definitive scenarios can be considered once management zones are confirmed and figures for eligible SAWR land areas are re-calculated for the new Plan area.

# Mataranka - Tindall Limestone Aquifer Water Allocation Plan, 2019 - 2029

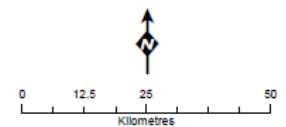


- Legend**
- Revised WAP 2019 - 2029
  - Previous WAP Area
  - Beetaloo Sub-basin
  - NT Parks and Reserves
- Cadastre - Tenure Type**
- Freehold
  - Pastoral Lease
  - Crown Lease Perpetual
  - Crown Lease Term
  - Crown Land
  - Government Use
  - Special Purposes Lease
  - Reserve
  - Other Leases

**DATA SOURCE:**  
 Water Resource Information: Department of Environment and Natural Resources  
 Parks: Parks and Wildlife Commission NT  
 Cadastre/Roads/Placenames:  
 Department of Infrastructure, Planning and Logistics  
 Drainage: 250K © Commonwealth of Australia (BoM) 2014

**DENR discussion purposes only  
 Not for public display**

Map compiled: 21/09/2018  
 Department of Environment and Natural Resources  
 Geospatial Services  
 Drawing No. DENR2018088



## Tindall Mataranka to Daly Waters WAC Meeting 7 25th October 2018

### Agenda Item 5 - Draft Vision, Principles, Outcomes and Objectives for the Mataranka Tindall Limestone Aquifer Water Allocation Plan 2019-2019

#### *WAC Action required:*

- Note the structure of the vision-principles-outcomes-objectives framework being presented
- Consider the draft 'Vision' statement and recommend any necessary changes

#### 1.0 Introduction

The Vision, Principles, Outcomes and Objectives of a Water Allocation Plan (the WAP) create an important guiding framework on which all other elements of the WAP are built, including its ongoing implementation and evaluation.

The Water Advisory Committee (the WAC), representing key stakeholders and water users in the community, has a pivotal role in shaping this guiding framework such that it reflects current and projected environmental, cultural, social and economic values of the water resource.

The outcomes of a Values Workshop undertaken by the WAC this year is shaping the articulation of the Vision, Principles, Outcomes and Objectives for the *Mataranka Tindall Limestone Aquifer Water Allocation Plan*. The beginnings of this framework are presented below as a starting point for further development by the WAC and the Department.

#### 2.0 Purpose of a WAP

The purpose of the WAP is to give effect to section 22B of the Northern Territory (NT) *Water Act 1992*. A water allocation plan can be declared by the Minister in respect of a water control district and water resource management in the water control district is to be in accordance with the water allocation plan. The region covered by the Mataranka- Tindall Limestone Aquifer is within the Daly Roper Beetaloo Water Control District.

Section 22B of the *Water Act* states:

*(5) A water allocation plan is to ensure in the water control district that:*

- (a) Water is allocated within the estimated sustainable yield to beneficial uses;*
- (b) The total water use for all beneficial uses (including those provided through rural stock and domestic use and licences granted under sections 45 and 60) is less than the sum of the allocation to each beneficial use;*
- (c) The right to take or use water under a licence granted under section 45 or 60 is able to be traded (in part or in full); and*
- (d) As far as possible – the full cost for water resources management is to be recovered through administrative charges to licensees and operational contributions from licensees.*

*(6) An allocation under subsection 5a is to include an allocation to the environment.*

## WAP Vision statement

The waters of the Mataranka Tindall Limestone Aquifer are shared between all users in a sustainable, reliable and equitable manner, while maintaining environmental flows in the Roper River and connected water dependent environments.

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## Management Principles

*Principles describe agreed ways of doing business and reflect the assumptions that underlie the development, implementation and evaluation of the Water Allocation Plan (WAP).*

1. Management settings in the WAP acknowledge the interconnectedness of groundwater and surface water expressions across the region, including stream flows in the Roper River and its tributaries both within and downstream of the Plan area. In this Plan, dry season stream flows are treated as a component of the Tindall Limestone groundwater resource and will be considered as such in the water account.
2. Management settings in the WAP are based on the best available knowledge of the dynamics and condition of the Tindall Limestone groundwater resource and the impact of extraction from this resource on the environmental, cultural, social and recreational values of the region.
3. Meeting the water needs of the environment, cultural practices, regional towns and communities, recreation activities, tourism operations, pastoral stations and Aboriginal economic development are priorities under this Water Allocation Plan, followed by those of water consumptive industries such as irrigated agriculture, mining and petroleum.
4. The modelling and management settings in the WAP recognise and incorporate the best available science on climate projections and the uncertainty associated with future trends in climate and resource use.

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**Outcomes (previously 'Objectives')** *Successful achievement of Outcomes leads to achievement of the Vision.*

1. The Tindall Limestone aquifer, and its connected surface waters, *continue to maintain the ecological integrity of* aquatic and associated terrestrial ecosystems and dependent cultural, recreational, and social values within the Plan area, including those downstream ecosystems which are highly dependent on Roper River flows from the Plan area.
2. Cultural flows and culturally significant water-dependent sites which are essential to sustaining traditional Aboriginal land use and cultural practices are protected from the potential impacts of groundwater extraction in the Plan area.
3. Towns, communities and rural properties have access to a quality, reliable water supply for domestic and visitor consumption (including downstream communities dependent on baseflow contributions from the Plan Area), and provision is made for current and future stock watering requirements.
4. Sustainable management of the Tindall Limestone aquifer and connected surface flows is supporting the region's economic development by:
  - a) *enabling water allocations to responsible and productive water consumptive industries* such as agriculture and tourism, while avoiding detrimental impacts on environmental and cultural values.
  - b) supporting commercial development opportunities on Aboriginal lands in the Plan area through implementation of the Strategic Aboriginal Water Reserve



### 3.0 Estimated Sustainable Yield ( ESY)

As specified in the *Water Act* (NT), a critical part of water allocation planning is understanding the water resource and defining the ‘estimated sustainable yield’. The estimated sustainable yield (ESY) is:

The amount of water allocated to all beneficial uses, including the environment, for a defined water resource where the level of allowed water extraction or diversion does not compromise key cultural and environmental values, ecosystem functions, or the productive base of the water resource. Usually there is a consumptive pool identified as part of the estimated sustainable yield.

The ESY is used to provide for water resources to be distributed to non-consumptive and consumptive beneficial uses. This is important for ensuring that cultural flows, environmental flows and water-dependent ecosystems are maintained, for ensuring that water quality is suitable for identified ‘beneficial uses’ and for establishing the amount of water which can be allocated for drinking water and sustainable economic development. Once the ESY is determined and the environmental and associated cultural water requirements are established, the volume of water that can be allocated for consumptive use is derived, and a process for assigning the consumptive pool across different beneficial uses is undertaken, based on current use, predictions of demand and industry and economic development goals.

The Mataranka Tindall WAP area is located within the Daly Roper Beetaloo Water Control District. Under the *Water Act*, the following beneficial uses are declared for the District:

<b>Beneficial use</b>	<b>Purpose</b>	<b>Pool</b>
Environment	to provide water to maintain the health of aquatic ecosystems	Non consumptive
Cultural	to provide water to meet aesthetic, recreational and cultural needs	Non-consumptive Consumptive
Public water supply	to provide source water for drinking purposes delivered through community water supply systems	Consumptive
Rural stock and domestic	to provide rights and ownership rights to take water for domestic and/or stock purposes as permitted under the Act	Consumptive
Agriculture	to provide irrigation water for primary production, including related research	Consumptive
Aquaculture	to provide water for commercial production of aquatic animals, including related research	Consumptive
Industry	to provide water for industry, including secondary industry and a mining or petroleum activity and other industry uses	Consumptive

These beneficial uses should be considered in relation to the Vision, Principles, Outcomes and Objectives for the Mataranka Tindall WAP.

In addition, the *Strategic Aboriginal Water Reserve (SAWR) Policy Framework* was introduced by the NT government in 2017. The SAWRs are volumes of water set aside within a WAP area exclusively accessible to eligible Aboriginal landowners to use or trade for the purpose of economic development. It is anticipated that the *Water Act* will be amended shortly to include SAWR within the beneficial uses identified in the Act. As such, a SAWR (consumptive use) will be considered within the new Mataranka Tindall WAP as a beneficial use, aligning with government policy.

#### 4.0 Vision, Principles, Outcomes and Objectives for the Mataranka Tindall Limestone Aquifer Water Allocation Plan – for discussion with WAC

##### Vision

The waters of the Mataranka Tindall Limestone Aquifer are shared between all users in a sustainable, reliable and equitable manner while maintaining environmental flows in the Roper River and surrounding groundwater dependent environments (*for WAC discussion and decision*)

##### Management Principles

*Principles describe agreed ways of doing business and reflect the assumptions that underlie the development, implementation and evaluation of the Water Allocation Plan (WAP).*

- Management settings in the WAP acknowledge the interconnectedness of groundwater and surface water expressions across the region, including stream flows in the Roper River and its tributaries both within and downstream of the Plan area. In this Plan, dry season stream flows are treated as a component of the Tindall Limestone groundwater resource and will be considered as such in the water account.
- Management settings in the WAP are based on the best available knowledge of the dynamics and condition of the Tindall Limestone groundwater resource and the impact of extraction from this resource on the environmental, cultural, social and recreational values of the region.
- Meeting the water needs of the environment, cultural practices, regional towns and communities, recreation activities, tourism operations, pastoral stations and Aboriginal economic development are priorities under this Water Allocation Plan, followed by those of water consumptive industries such as irrigated agriculture, mining and petroleum.
- The modelling and management settings in the WAP recognise and incorporate the best available science on climate projections and the uncertainty associated with future trends in climate and resource use.

Beneficial uses	Outcomes	Objectives	Activities/strategies	Performance indicators
	<i>Successful achievement of Outcomes leads to achievement of the Vision.</i>	<i>Objectives are things that we are planning to do that will lead to the stated Outcomes</i>	<i>Specific management actions in the Plan that will contribute to achieving the Objectives.</i>	<i>Performance Indicators are what we measure to determine achievement of Outcomes</i>
<ul style="list-style-type: none"> <li>• Environment</li> <li>• Cultural (Aboriginal)</li> <li>• Cultural (recreation)</li> </ul>	<p>1.0 The Tindall Limestone aquifer, and its connected surface waters, are supporting the health and natural variability of aquatic and associated terrestrial ecosystems and dependent cultural, recreational, and social values within the Plan area, including those downstream ecosystems which are highly dependent on Roper River flows from the Plan area.</p>	<ul style="list-style-type: none"> <li>• <i>Management zoning is protecting the quality and dynamics of the aquifer, including the mixing of groundwater from different zones, and contributing to the maintenance of water security and reliability for consumptive uses</i></li> <li>• <i>Discharge protection areas are applied within North and South Mataranka zones</i></li> <li>• <i>Existing monitoring of stream flows, ground water levels and water quality is maintained</i></li> <li>• <i>Groundwater and in-stream monitoring is improved to enable the detection of changes in water levels/flows and quality in each management zone, as well as from the neighbouring Beetaloo North and South WAPs that are related to seasonal conditions, extraction activity and land use changes.</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Annual extraction limits are applied to each zone</i></li> <li>• <i>Limits to bore pump capacity are applied to manage potential intensification of drawdown in North &amp; South Mataranka zones.</i></li> <li>• <i>Trading rules are applied to prevent concentration of extraction in a single zone.</i></li> <li>• <i>Extraction within discharge protection areas is managed according to limits to annual extraction and/or pump capacity</i></li> <li>• <i>No new licences are issued within discharge protection areas.</i></li> </ul>	<ul style="list-style-type: none"> <li>• TBC</li> <li>• <i>Target flow at Elsey gauging station for 1 November (end of dry season)</i></li> </ul>

<ul style="list-style-type: none"> <li>• Cultural (Aboriginal)</li> </ul>	<p>2.0 Cultural flows and culturally significant water-dependent sites which are essential to sustaining traditional Aboriginal land use and cultural practices are protected from the potential impacts of groundwater extraction in the Plan area.</p>	<ul style="list-style-type: none"> <li>• TBC</li> </ul>	<ul style="list-style-type: none"> <li>• TBC</li> </ul>	<ul style="list-style-type: none"> <li>• TBC</li> </ul>
<ul style="list-style-type: none"> <li>• Public water supply</li> <li>• Rural stock and domestic</li> </ul>	<p>3.0 Towns, communities and rural properties have access to a quality, reliable water supply for domestic and visitor consumption (including downstream communities dependent on baseflow contributions from the Plan Area), and provision is made for current and future stock watering requirements.</p>	<ul style="list-style-type: none"> <li>• TBC</li> </ul>	<ul style="list-style-type: none"> <li>• TBC</li> </ul>	<ul style="list-style-type: none"> <li>• TBC</li> </ul>
<ul style="list-style-type: none"> <li>• Agriculture</li> <li>• Aquaculture</li> <li>• Industry</li> <li>• <i>Strategic Aboriginal Water Reserve<sup>1</sup></i></li> <li>• <i>Mining<sup>1</sup></i></li> <li>• <i>Petroleum<sup>1</sup></i></li> </ul>	<p>4.0 Sustainable management of the Tindall Limestone aquifer and connected surface flows is supporting the region’s economic development by:</p> <ol style="list-style-type: none"> <li>enabling equitable access to water for responsible water consumptive industries such as agriculture and tourism, while avoiding detrimental impacts on environmental and cultural values.</li> <li>supporting commercial development opportunities on Aboriginal lands in the Plan area through implementation of the Strategic Aboriginal Water Reserve</li> </ol>	<ul style="list-style-type: none"> <li>• <i>The consumptive pool for each management zone is clearly communicated and supported by clear rationale and scientific rigour.</i></li> <li>• <i>Recouping and reallocating unused water (NT Gov policy) is supporting the attainment of WAP Outcomes and maximising access to water resources for commercial purposes, including the SAWR</i></li> <li>• <i>The WAP is providing clear direction for the determination of Annual Announced Allocations (AAA), and the decisions made under AAAs are consistent with the desired Outcomes of the WAP.</i></li> </ul>	<ul style="list-style-type: none"> <li>• TBC</li> </ul>	<ul style="list-style-type: none"> <li>• TBC</li> </ul>

<sup>1</sup> Not yet a declared beneficial use under the Water Act, however, part of agreed government policy which is in the process of becoming a beneficial use under the Act

# Roper River fish movement study

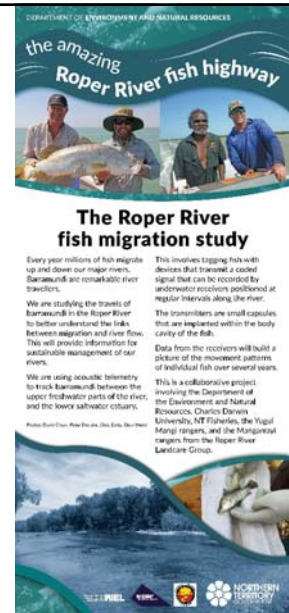
Peter Dostine  
Department of Environment and Natural Resources  
October 2018

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## Contributors

- Department of Environment and Natural Resources
- Charles Darwin University
- NT Fisheries
- Yugul Mangi Land and Sea Management Rangers
- Mangarrayi Rangers



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## Context

- Perennial spring-fed river
- Low flows ~2 cumecs by late dry season
- Decadal-scale variability in wet season flow
- Currently in low flow phase
- Challenge for ecological studies to span flow variation
- Big wet seasons driver of river productivity
- Movement of biota critical process



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TLC200 2015/10/14 11:23:12

## Context

- River-wide movement of biota
- Strong linkages between freshwater and estuarine systems
- High proportion of fish fauna is diadromous
- Subsidies from estuary into freshwater underpin food webs
- Understanding of phenomena of broad-scale movement critical for management

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## Context



*Hypseleotris compressa*



*Macrobrachium spinipes*

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## Context

- Building pressures on river ecosystem
- Extraction for mining operations (3?)
- Wet-season harvesting and off-stream storage
- Groundwater extraction for irrigation
- Management framework to limit adverse impacts

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## Objectives

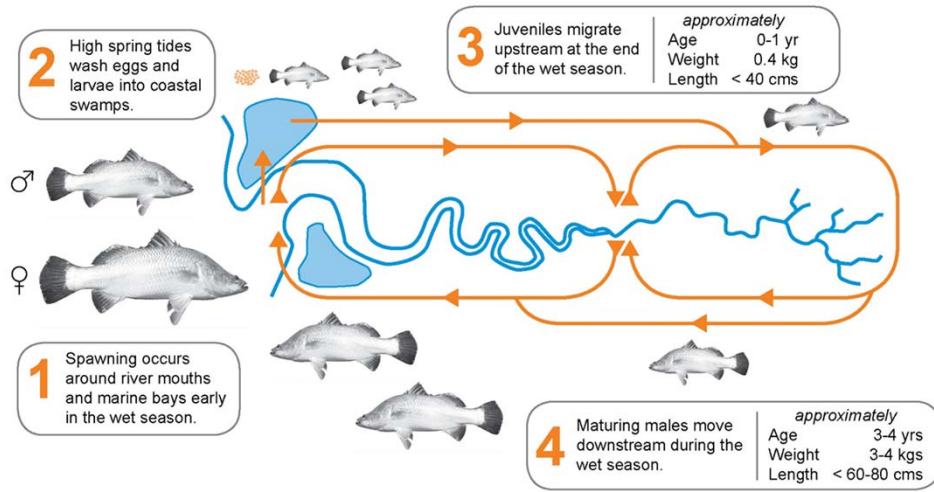
- Nature and extent of broad-scale movements of barramundi in the Roper River
- Focus on timing and flow of passage across potential barriers in lower freshwater reaches

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## BARRAMUNDI CYCLE



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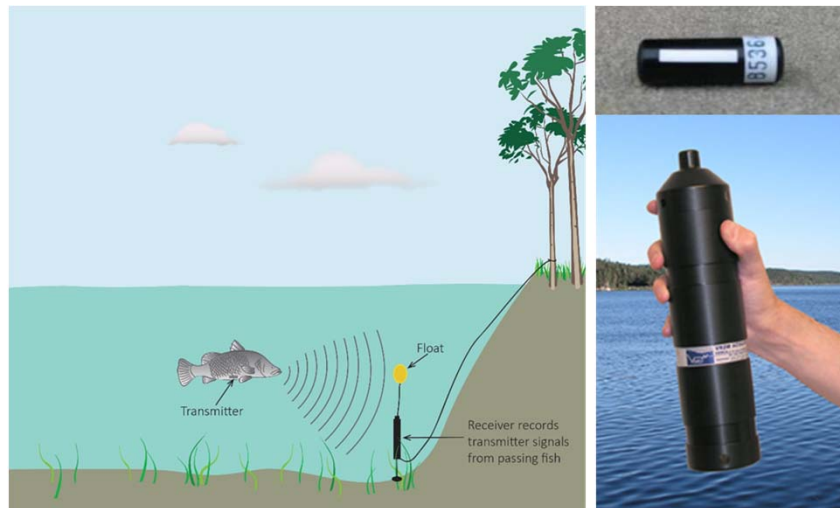
Figure 1. (a) Riffle cascade at 'The Swing' on Lonesome Dove station. (b) aerial view of 'The Swing'. (c) riffle cascade beside lateral gravel bar, Scrapper Hole paddock, Mt McMinn station. (d) aerial view of lateral gravel bar on Mt McMinn station. (e) road crossing at Roper Bar, and (f) aerial view of Roper Bar.

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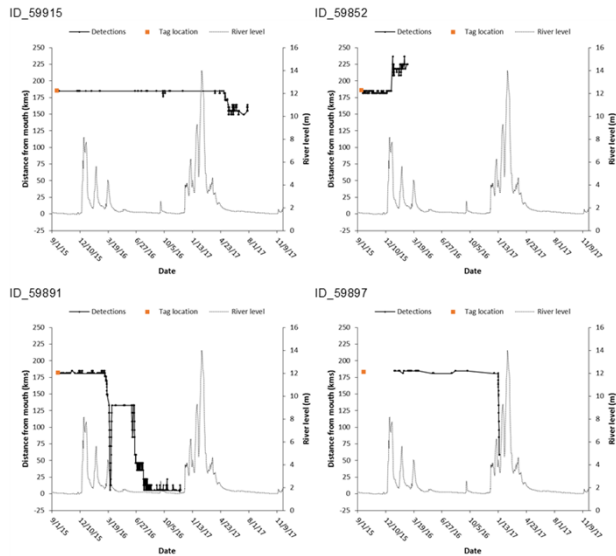




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Tagged in freshwater  
September 2015  
Mt McMinn

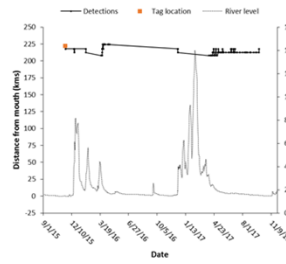


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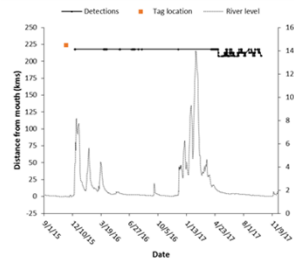


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November 2015  
Flying Fox

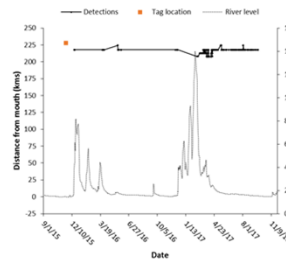
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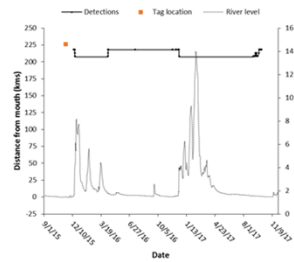
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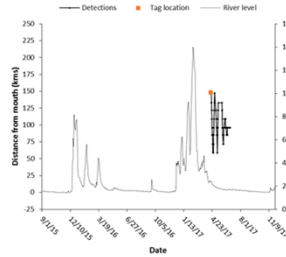


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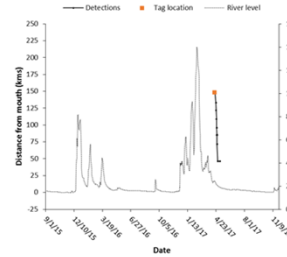


Tagged at Roper Bar  
April 2017

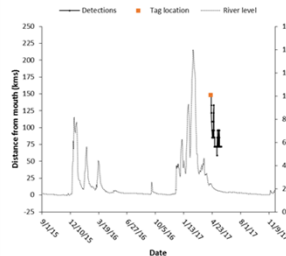
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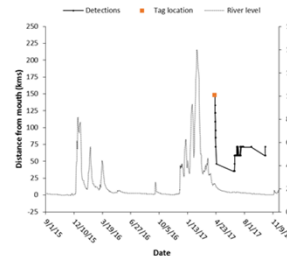
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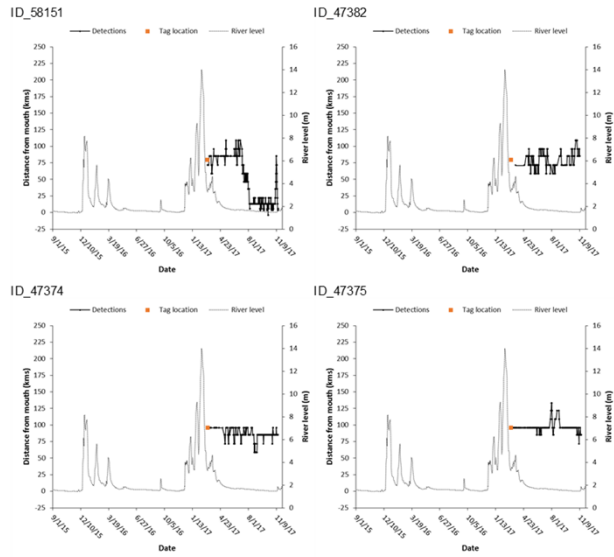
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[www.nt.gov.au](http://www.nt.gov.au)



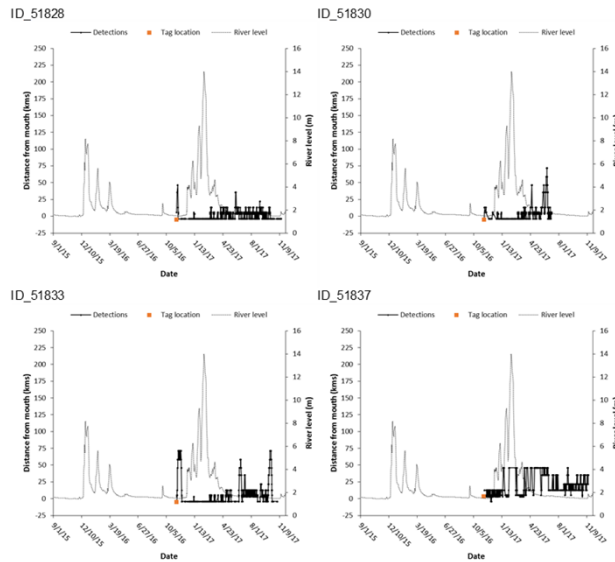
Tagged in mid-estuary  
March 2017



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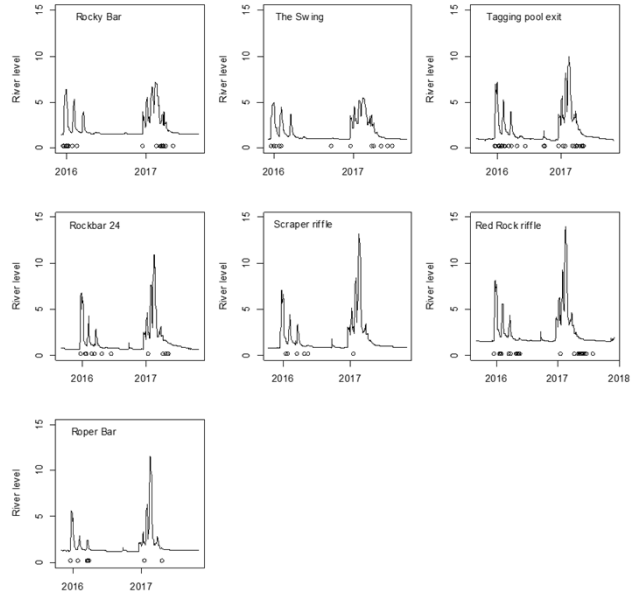
Tagged at Roper mouth  
November 2016



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Timing of downstream movement across seven potential barriers



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Flow threshold for barramundi passage over Roper Bar

Fish#	FishID	Event	Passage	Date	Time	Flow (m <sup>3</sup> /s)
11	59915	5	fail	14/07/2017	16:26	3.8
11	59915	4	fail	26/06/2017	5:05	4
11	59915	3	fail	6/06/2017	16:06	4.3
11	59915	2	fail	30/05/2017	23:26	4.8
11	59915	1	fail	22/05/2017	4:24	6.4
8	59904	2	fail	18/05/2016	14:48	6.8
12	59919	3	fail	16/05/2017	3:46	7
8	59904	1	fail	12/05/2016	11:58	8
12	59919	2	fail	10/05/2017	2:52	8.7
5	59893	1	?	3/05/2017	19:15	10.9
1	59843	3	fail	25/01/2016	20:39	11.6
1	59843	2	fail	18/01/2016	13:53	22.6
1	59843	1	fail	17/01/2016	10:36	25.6
7	59903	1	?	7/04/2017	4:16	53.3
2	59855	1	success	24/03/2016	6:25	73.8
1	59843	4	success	29/01/2016	21:28	89.9
9	59909	1	success	22/03/2016	16:50	118.2
3	59891	1	success	16/03/2016	15:41	124.9
6	59897	1	success	13/01/2017	15:51	176.4
4	59892	1	success	14/01/2017	4:54	226.5
10	59914	1	success	19/12/2015	2:15	236

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## Preliminary conclusions

- High individual variability
- Low migration rates (in low flow years?)
- Spawning migration on flood pulses
- Most movement within ~ 40 days of start of flow
- Threshold for downstream movement across Roper Bar ~ 50 cumecs
- No upstream migration of year 1+ fish tagged in estuary
- Mouth critical spawning habitat

# Groundwater Quality in the Mataranka WAP region

Julia Schult  
Aquatic Health Unit/DENR  
October 2018

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## Why monitor groundwater quality?

- Source of surface water in the dry season
- ➔ Groundwater quality directly affects aquatic ecosystems
- Main potential contaminants: agricultural chemicals, nutrient pollution
- Very limited baseline information available for NT



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## What is being monitored?

- DENR rolling program of groundwater monitoring in 4 Top End WAP areas. Started in 2015, recurring every 5 years
- ~20 bores are tested in each region for **general water chemistry, nutrients** and **>150 herbicides and insecticides**
- Sample locations include areas of agricultural, conservation and intensive land uses



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## Nitrate

- Globally the main contaminant of groundwater
- Sources: fertilisers, sewage, septics, manure, land use change
- Can contribute to algal blooms and ecological changes in aquatic environments
- Harmful to humans in high concentrations



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# LICENSING CONSIDERATIONS FOR SURFACE WATER FLOOD HARVESTING

Tim Bond, Director Water Planning & Engagement, Dept. of Environment & Natural Resources

October – November 2018

Water Advisory Committees

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## Approach

- NT Government has contracted **Water Solutions** to develop a draft NT surface water flood harvesting assessment policy
- The Department for Environment and Natural Resources will be talking to key stakeholders
- This workshop is an opportunity to gather information about surface water flood harvesting from people who have knowledge and experience in water management

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## Workshop

- Introduction to the project and the consultant
- Background on surface water harvesting
- Overview of the workshop
- Exercise 1: Policy development
- Exercise 2: Measuring success
- Wrap up

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## What is surface water flood harvesting?

Surface water flood harvesting is taking or diverting water from waterways during periods of high flow for beneficial uses.

The water could be stored for later use, used immediately or a combination of both.

Beneficial uses:

- Rural stock and domestic
- Public water supply
- Aquaculture
- Agriculture
- Cultural (recreation, amenity, aesthetic)
- Industry (including mining & petroleum)
- Strategic Aboriginal Water Reserve
- Environment

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## Tindall Mataranka to Daly Waters Water Advisory Committee Meeting 7 - 25th October 2018

### Workshop session on surface water flood harvesting policy and success measures

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#### 1.0 Record of Committee feedback

##### Part 1 Policy Development - What would a successful and sustainable surface water flood harvesting system look like?

- Addresses different types of harvesting:
  - in-stream dams (including hillside capture)
  - off-stream storage (involves pumping)
  - managed aquifer recharge
- Right set of controls around timing and quantity of harvesting
- Need access to hydrological information to assist licence applicants e.g. information similar to land suitability information which supports appropriate regional development
- Harvesting should not be permitted until a water allocation plan is in place
- Need mechanisms to ensure that harvesting infrastructure is well-engineered to minimise losses (leaks, evaporation, seepage etc.)
- Assessment of licence applications should be outcome based
- Need more complete knowledge of surface hydrology on which to base assessments
- Need more knowledge of the dependency of ecosystem function on flood phases e.g. first flush as trigger for fish movement on the Roper
- What is a flood?
  - Need clear catchment-based definitions
  - Definition should describe conditions for different types of flow – base-flow, in-channel flow, floodplain flow
  - Describe probability of different types of flow
- Assessment – ‘land suitability’ is part of applicants business planning process; ‘water demand’ is the responsibility of licence assessment process
- Consider risk-based assessment of applications and the application of some sort of ‘environmental guarantee’
- Consider use of harvested resource for supplementing environmental flows
- Intensity of management/regulatory regime should be commensurate with demand in a catchment

##### Part 2 Measuring Success - How would the success of the surface water flood harvesting policy be measured?

- Incorporate a metric for the economic value generated by the development, not simply the number of developments
- Contribution made to regional community (regional gross domestic product)
- Quality of metering
- Environmental systems remain intact
- Quality of environmental monitoring in place e.g. bunding of fuel tanks
- Compliance with proposed business plan/property development schedule

## Background

- » Groundwater used for development in the NT approaching full allocation
- » Focus now turning to the harvesting of flood flows
- » A policy / process needs to be developed to licence and manage the expected demand for surface water flood harvesting water allocations
- » Project objective: *To develop a NT surface water flood harvesting assessment policy that reflects contemporary industry best practice and is consistent with existing Water Legislation and the NT Water Allocation Planning Framework*

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## Key Principles

- » Best practice
- » Based on available science and resources
- » Sustainable while facilitating regional development
- » Practical and able to be implemented
- » Considers National Water Initiative (NWI) principles

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# National Water Initiative Principles

The NWI seeks to achieve:

- Transparent, statutory based water planning;
- Knowledge and capacity building;
- Community partnerships and adjustment;
- Confidence for investment through defined water licence security;
- Water for environmental flows, Indigenous people and other public benefit outcomes;
- Water trading for more profitable use of water;
- Enhanced water use efficiency in urban and rural areas;
- Water use metering to provide accurate information for planning and management;
- Recognition of the connectivity between surface and groundwater.

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# NWI – Water Entitlement Principles

The consumptive use of water requires a water access entitlement that:

- Is separate from land
- Is consistent with a water plan
- Specifies essential characteristics of the product
- Is exclusive
- Is able to be traded, given, bequeathed or leased
- Is able to be subdivided or amalgamated
- Is able to be mortgaged
- Is enforceable and enforced
- Is recorded in a public water register
- Clearly indicates responsibilities and obligations
- Is only able to be cancelled when clearly breached
- Is subject to emergency conditions

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## NWI – Regulatory Approval Principles

Regulatory approvals enabling water use will:

- » be consistent with NRM legislation and water plans
- » take into account environmental, social and economic impacts of use
- » clearly state the conditions relating to the approval
- » minimise application and compliance costs for applicants
- » allow for applications to be assessed to a level of detail commensurate with the potential impact
- » have transparent and contestable processes in place
- » have avenues for appealing approval decisions

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## Surface Water Flood Harvesting

A typical surface water flood harvesting scheme involves:

- » An off-stream storage / ring tank
- » A pump station (or gravity diversion) that can divert high flows into the storage under a set of access rules (thresholds, volumes, etc)
- » Delivery system from the storage to the end use (agriculture, aquaculture, industrial, urban, etc)

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## Flood Flow Access Rules

- » NT Water Allocation Planning Framework
  - 80/20 Rule (and 95/5 rule)
- » Erskine Recommendations (for the Daly River)
  - Protect flows below a specified minimum flow
  - The rising limb and peak of significant within-channel floods should be maintained.
  - The rising limb, peak and recession to 1 m below the peak of floodplain floods should be maintained.
  - Investigate to see if the first flush flood should be protected.

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## Workshop

Two exercises of 15 minutes each.

- 5 minute introduction
  - 10 minute talking and information gathering
- No right or wrong answers – we're seeking your thoughts

You can change tables during or between exercises

Please let everyone at the table have a chance to speak

You can choose a specific subject or provide general comments

There is an info sheet on the table with the question and background

Dot points, drawings, diagrams – anything is OK

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**What would a successful and sustainable surface water flood harvesting system look like?**

**Think about.....**

- What information is required to assess a surface water flood harvesting application?
- What key dimensions / conditions should be listed on a surface water flood harvesting licence?
- How should environmental flow requirements be met (80/20, Erskine, etc)
- How will surface water flood harvesting operate in real time?

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**How would the success of the surface water flood harvesting policy be measured?**

**Think about.....**

Outcomes

- number of developments
- area developed
- product produced
- water captured and used
- local employment
- contribution to regional gross product

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**How would the success of the surface water flood harvesting policy be measured?**

## Think about.....

- environmental water requirements
- public benefit, cultural needs
- metering , monitoring and reporting
- compliance with the license conditions

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## Next steps

- March 2019 project completed by Water Solutions
- Peer review
- Public consultation on the draft policy to follow with
  - Key stakeholders
  - Water Advisory Committees
  - General community

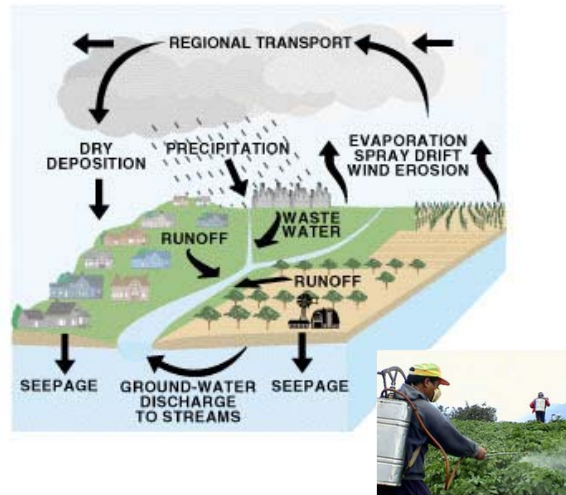
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# Pesticides

- Inappropriate application and storage of pesticides can lead to groundwater contamination
- Highest risk: chemicals that are water soluble and persistent

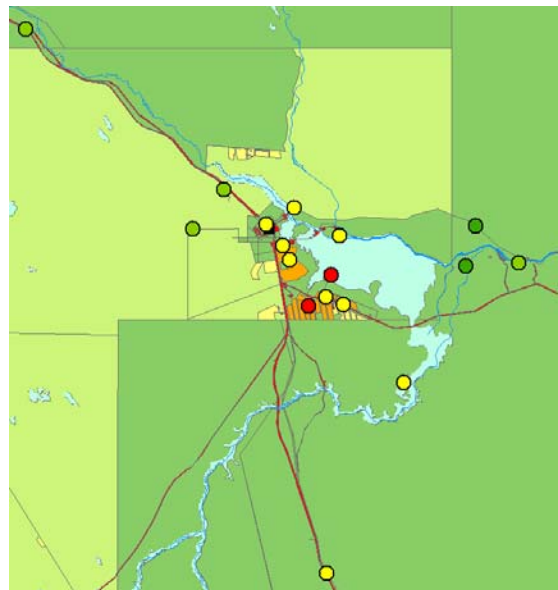


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# Results - Nitrate ( $\text{NO}_3$ )

- < Drinking water guideline
- Wide range of concentrations in groundwater indicates high  $\text{NO}_3$  is not natural
- Higher concentrations are found in more developed areas and more intensive land uses
- Relatively high concentrations compared to Katherine/Ooloo region



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## Results - Pesticides

- Very few detections (5 bores)
  - 2 insecticides, 2 herbicides
- << Drinking and Environmental guidelines
- Very low levels of contamination, similar to other Top End regions



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## What does it mean?



### Bad news:

Current human activities are affecting groundwater quality



### Good news:

Levels of contamination are very low and not affecting human and ecosystem health

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## What next? Future Monitoring Options

Action	Pros	Cons
Continue current program	<ul style="list-style-type: none"> <li>• Sampling close to potential source</li> <li>• Broad range of sites</li> </ul>	<ul style="list-style-type: none"> <li>• Low frequency (every 5 years)</li> <li>• Impacts are localised and random sampling does not cover all licensees</li> <li>• Cost</li> </ul>
Monitor springs, not bores	<ul style="list-style-type: none"> <li>• Integrate all areas</li> <li>• Less expensive</li> </ul>	<ul style="list-style-type: none"> <li>• Delay in detecting potential impacts</li> </ul>
Include sampling requirement in licence conditions	<ul style="list-style-type: none"> <li>• Early detection</li> <li>• Onus on resource users/polluters</li> </ul>	<ul style="list-style-type: none"> <li>• Cost to licensees (~\$700/sample)</li> <li>• Regulation required</li> </ul>

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## Surface Water Quality Projects

### Collaboration with Mangarrayi rangers

Weekly dry season sampling at Elsey Station to monitor nutrients, turbidity and conductivity

### Annual Catchment Water Quality Monitoring

Mid-dry season sampling of the Roper River, tributaries and springs at 11 sites. Indicators include nutrients, PFAS, pesticides



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## Tindall Mataranka to Daly Waters WAC Meeting 7 25th October 2018

### Agenda Item 9 – Management zones

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#### ***WAC Action required:***

- Note the information presented in this paper
  - Recommend final management zones and discuss management approaches for each
  - Note the scenarios for use of recharge and discharge figures and implications for Estimated Sustainable Yields and Consumptive Pools in each zone.
- 

#### **1.0 Purpose of management zones**

Management zones enable a Water Allocation Plan to be responsive to our understanding of water resource dynamics, the needs of beneficial uses, risk and future trends, by creating management arrangements appropriate to each zone.

Zoning of the Mataranka Tindall WAP Area will enable:

- Implementation of surface and groundwater management practices that recognise the variable nature of the aquifer across the Tindall Mataranka Plan Area;
- Protection of spring discharges and seepage areas and groundwater-dependent ecosystems which would be impacted by concentrated groundwater extraction and localised aquifer drawdown; and
- Protection of water quality and entitlement reliability for existing consumptive users (including stock bores and licenced irrigators) who could be impacted by concentrated groundwater extraction and localised aquifer drawdown

#### **2.0 Guiding principles for defining management zones**

During Meeting #6, the WAC recommended some broad principles to be applied to the determination of management zones within the Plan Area, following consideration of information on zone characteristics (see Table 1 below).

Note that the boundary of the Plan Area has also been revised during this period.

The WAC recommended the following principles to form the basis of determining the three management zones proposed:

- **Maintain natural groundwater flows** through the aquifer i.e. direction and rate
- **Maintain water quality and natural mixing** of groundwater inputs from each zone, recognising that this is a significant determinate of in-stream water quality in the Roper
- **Reflect current and forecast land use intensity and essential infrastructure needs** (e.g. location of potable water borefields)
- **Reflect the heterogeneity of aquifer dynamics and water quality** across the Plan area, and distinguish zones where changes in aquifer conditions may impact beneficial uses within or adjacent to that zone
- **Distribute extraction and mitigate localised drawdown** through various mechanisms including water trading rules and maximum extraction limits
- **Deliver environmental flows** to iconic features (e.g. Bitter Springs) and groundwater dependent ecosystems (GDEs) (e.g. Warloch Ponds) via a management regime that mitigates the impact of regional groundwater extraction – spring/GDE protection areas should be considered

Table 1 presents a summary of the different hydrogeological dynamics and conditions that have been considered in recommending the three management zones - North Mataranka Zone, South Mataranka Zone, and Larrimah Zone (shown on map).

*Table 1: Summary of management zone characteristics*

North Mataranka Zone	South Mataranka Zone	Larrimah Zone
Groundwater flows from the north (near King River) to the south (Roper River)	Groundwater flows from south to north	Groundwater flows from south to north
Groundwater travel time to Roper River is less than 50 years	Groundwater travel time to Roper River is less than 50 years	Groundwater travel time to Roper River may be closer to 100 years
Contributes 75% of Tindall aquifer discharge to the Roper	Contributes 25% of Tindall aquifer discharge to the Roper	Contributes groundwater through flow to the South Mataranka Zone.
Annual rainfall approx. 1000-900mm Rainfall intensity and seasonal distribution different to South Mataranka	Annual rainfall approx. 900-850mm; increasing aridity	Annual rainfall approx. 850-790mm
Significant karstic and in-stream springs discharge to the Waterhouse River, Roper Creek and Roper Creek	Significant karstic and in-stream springs discharge to the Roper Creek, Roper River, Salt and Eley creeks. Groundwater expression supports large swamp and lagoon areas within Eley National Park and at Red Lily Lagoon.	Unknown and needs further investigation
Water quality is influenced by geological properties which are more typical of the Daly Basin, which is different to conditions in the South Mataranka zone. <ul style="list-style-type: none"> <li>• Low sodium, chloride and sulphate</li> <li>• Low Total Dissolved Solids (TDS)</li> <li>• Electrical conductivity (EC) – relatively low, increasing from north to south (up to 750-1000 <math>\mu\text{S}/\text{cm}</math> just north of Mataranka)</li> <li>• The ionic strength of a solution is a measure of the concentration of dissolved chemical constituents</li> <li>• Karstic spring flows - Rainbow Springs Springs) exhibit consistently higher ionic strength</li> </ul>	Water quality is influenced by geological properties more typical of the Georgina Basin, which are different to the North Mataranka and Larrimah Zone <ul style="list-style-type: none"> <li>• Groundwater inflows from Georgina Basin and southern Daly Basin</li> <li>• Elevated sulphate, sodium and chloride levels</li> <li>• Moderately high TDS – suitable for human consumption in the ‘poor palatability’ category by NHMCR Guidelines</li> <li>• Higher EC levels (1000 – 3000 <math>\mu\text{S}/\text{cm}</math>) derived from the rocks through which the groundwater flows in this zone. Some fresher water (750–1000 <math>\mu\text{S}/\text{cm}</math>) in the eastern aquifer recharge areas</li> <li>• Karstic spring flows - Fig Tree, Botanic Walk and Bitter springs - exhibit consistently higher ionic strength</li> </ul>	Water quality is influenced by geology and climate conditions which are different to the North and South Mataranka zones. <ul style="list-style-type: none"> <li>• Groundwater inflows from Georgina Basin</li> <li>• Elevated sulphate, sodium and chloride levels</li> <li>• Moderately high TDS – suitable for human consumption, but in the ‘poor palatability’ category according to NHMCR Guidelines</li> <li>• Higher EC levels (1000 – 3000 <math>\mu\text{S}/\text{cm}</math>) derived from the rocks through which the groundwater flows in this zone. Some fresher water (750 – 1000 <math>\mu\text{S}/\text{cm}</math>) in the eastern aquifer recharge areas</li> </ul>
Direct seasonal recharge effect on groundwater levels – average annual water level variation of 1.1m	Direct seasonal recharge effect on groundwater levels – average annual water level variation of 1.1m	Seasonal recharge effects on groundwater are more subtle – av. annual water level rise of 0.2m. Lag/buffered response where cretaceous cover is thicker and clay content higher.

**Sources:** Bruwer & Tickell (2015) & Karp (2008)

### 3.0 Management zones and application of recharge/discharge figures

Current knowledge of recharge and discharge figures for the Mataranka Tindall WAP area and the three proposed management zones is derived from the following:

- Bruwer, Q. and Tickell, S.J. (2015) *Daly Basin Groundwater Resource Assessment – North Mataranka to Daly Waters*, Dept of Land Resource Management, Water Resources Report Number 20/2015D
- Figures revised in October 2018 by the DENR Water Assessments team for new boundary of the Mataranka Tindall Limestone Aquifer Water Allocation Plan area and its proposed management zones

**Recharge** is the process by which water enters the aquifer. In the WAP area, this occurs primarily through infiltration of rainfall and through lateral inflow from aquifers to the south. Recharge is a key indicator of the availability of water for sustainable uses. Recharge of the aquifer is more strongly seasonal in the North and South Mataranka Zones compared to the Larrimah Zone where the influence of seasonal rainfall is buffered by a thicker layer of Cretaceous sediments of higher clay content through which water must percolate to the aquifer.

**Discharge** is the volume of groundwater leaving the Tindall Limestone Aquifer via springs and seepages and entering the Roper River and its tributaries. During the dry season, stream flows in the Roper River and tributaries within the Plan area are solely reliant on this water source. This means that for water accounting purposes, stream flows in the dry season should be treated as groundwater. Any measurable impact of groundwater pumping is therefore likely to be detectable as changes to discharge volumes, the equivalent of dry season stream flows.

Hydrogeological modelling has determined that 25% of the annual discharge to the Roper (equivalent of dry season stream flow) is sourced from the Tindall Aquifer in the South Mataranka Zone. The primary source of discharge to the Roper is the North Mataranka Zone, with 75% of annual discharge entering from this area.

The *NT Water Allocation Planning Framework* applies the 80:20 rule to setting the upper limit of consumptive use of the resource based on recharge and streamflow figures, where dry season streamflow is the equivalent of discharge for the Mataranka Tindall WAP.

Two approaches to establishing the **Estimated Sustainable Yield (ESY)** of the resource and the upper limit to the **consumptive pool** (using the 80:20 rule) are presented here:

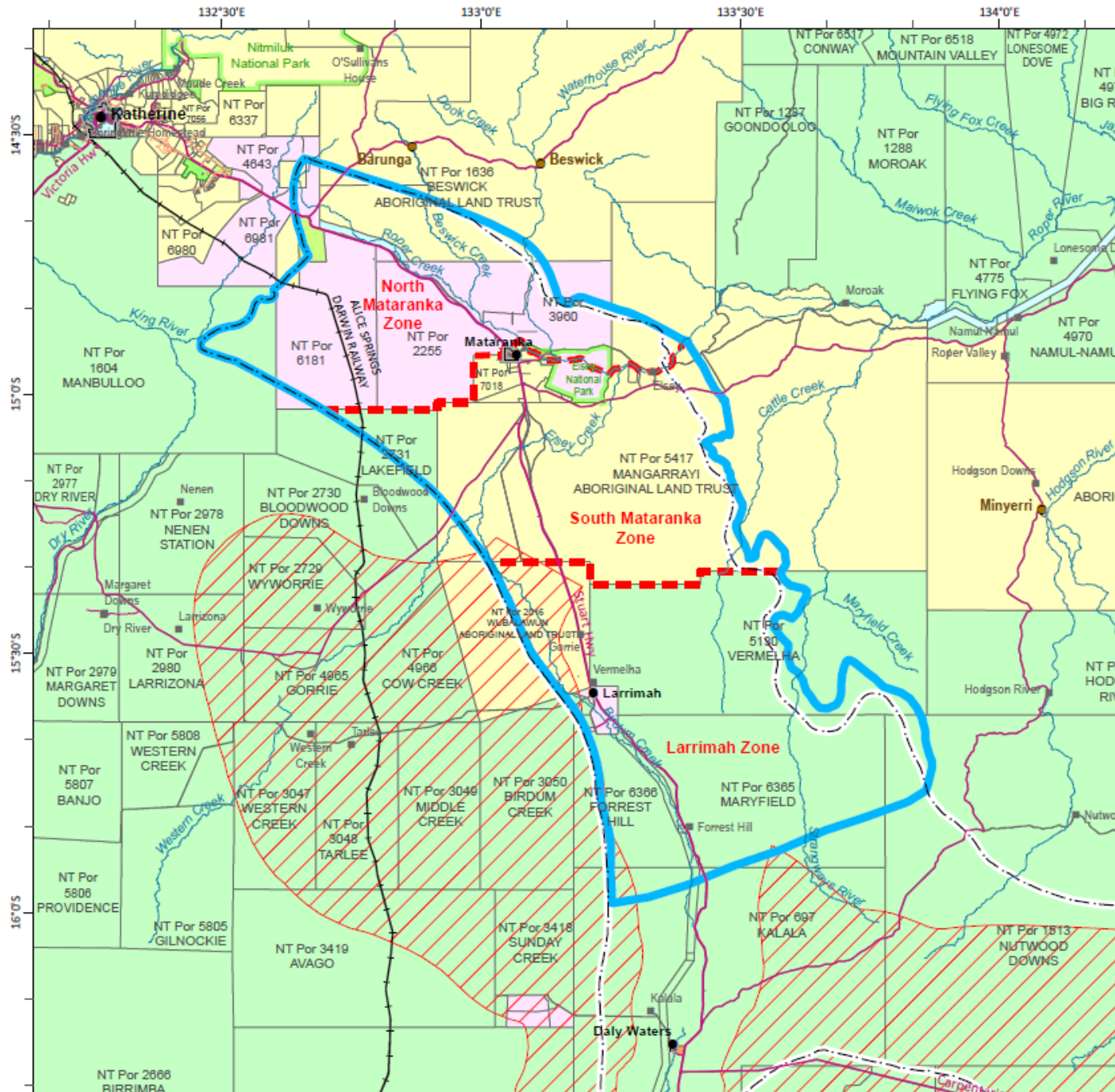
1. ESY is determined by ‘average’ annual recharge in all three zones – the consumptive pool is the sum of 20% of each zone
2. ESY is determined by a combination of average recharge in the Larrimah Zone and average discharge in the North Mataranka and South Mataranka Zones – the consumptive pool is the sum of 20% of each zone

*Table 2: Possible conceptual water sharing scenarios across management zones using average recharge and discharge figures*

ZONE	Land Area (ha)	% of Plan Area	Average annual recharge GL/yr	Consumptive pool (20%) recharge GL/yr	Average annual discharge GL/yr	Consumptive pool (20%) discharge & recharge GL/yr
Northern Mataranka	269,237	29.0%	130*	26.0	97	19.4
Southern Mataranka	282,122	30.4%			30	6.0
Larrimah	376,898	40.6%	88	17.6	*	17.6
<b>Total WAP Area</b>	<b>928,257</b>	<b>100%</b>	<b>218</b>	<b>43.6</b>	<b>127</b>	<b>43.0</b>

\* Work is underway by DENR Water Assessments team to establish figures for each zone

# Mataranka - Tindall Limestone Aquifer Water Allocation Plan, 2019 - 2029 Management Zones



- Legend**
- Management Zones
  - Revised WAP 2019 - 2029
  - Previous WAP Area
  - Beetaloo Sub-basin
  - NT Parks and Reserves
- Cadastre - Tenure Type**
- Freehold
  - Pastoral Lease
  - Crown Lease Perpetual
  - Crown Lease Term
  - Crown Land
  - Government Use
  - Special Purposes Lease
  - Reserve
  - Other Leases

**DATA SOURCE:**  
 Water Resource Information: Department of Environment and Natural Resources  
 Parks: Parks and Wildlife Commission NT  
 Cadastre/Roads/Placenames: Department of Infrastructure, Planning and Logistics  
 Drainage: 250K © Commonwealth of Australia (BoM) 2014

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Map compiled: 19/10/2018  
 Department of Environment and Natural Resources  
 Geospatial Services  
 Drawing No. DENR2018093

