

21 The current status of water governance in northern Australia: *audit and evaluation of northern Australian compliance*

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Kakadu Yellow Water Billabong, South Alligator River NT 2008
Photo: Kim Alexander

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AUDIT AND EVALUATION OF NORTHERN AUSTRALIA NATIONAL WATER INITIATIVE COMPLIANCE

1. KEY POINTS

- There are between 55 and 64 nominated water catchments in northern Australia, dependent on the definition of regional boundaries.
- The Northern Territory has one finalised plan for the Katherine Tindall catchment and two in progress for the Oolloo aquifer in the Daly and the Tindall aquifer at Mataranka. All water caps are provisional; and there is no significant development towards compliance of surface water management with the NWI. Approximately 1.5 Gls are extracted from the Daly-Tindall aquifer: A cap has been established at 16 Gls and there are licence applications for approximately 75 Gls. Water for use by Indigenous communities has been set at 25 Gls.
- Queensland has finalised Water Resource Plans and draft Resource Operations Plans for the Mitchell and Gulf catchments (comprising 9 sub catchments). The *Water Resource (Mitchell) Plan 2007* applies to watercourses, lakes, springs not connected to Great Artesian Basin, water collected in dams and weirs built across watercourses, water from aquifers, and overland flow. The draft plan provides for the release of 70 000 ML of additional unallocated water throughout the plan area to meet future water demands. There is also provision for seasonal trading of water taken under licences in the Upper Mitchell River sub-catchment. The Indigenous reserve has been set aside to assist Indigenous communities in the Cape York Peninsula region achieve their social and economic aspirations, as outlined in the *Cape York Peninsula Heritage Act 2007*.
- The Ord water management plan was reviewed in 2008, with further review as part of the Kimberley Regional Plan due for draft release in 2010. The draft La Grange groundwater allocation plan was released in 2008. These are currently non-statutory but can transition to statutory plans when enabling legislation is passed. Water resources have generally been managed under the licensing provisions of the current Act. The *La Grange Groundwater Subareas Water Management Plan – Allocations* describes principles and policies that guide water licensing. Increasing demand on water supplies is expected due to expansion of horticulture and possible expansion of mining activities in the south. A Water Quality Protection Plan exists for the area around Fitzroy Crossing to protect the drinking water supply for the area. Current groundwater extraction licences amount to 20.63 GL/year. These licences range from small community water supplies (<10 ML/year) to larger mining supplies (~4000 ML/year) (1).
- The current state of northern Australia water planning is characterised by very few developed plans, although there are many basins included in this geographical region. Water planning corresponds to a power law distribution (also known colloquially as the 80:20 rule). The power law predicts preferential attraction, where those with more (planning) gain more than those without: Development maybe accelerated and rapid in basins with completed water plans. Hence a cautionary approach is warranted to ensure over assigned water systems and excess demand on infrastructure does not eventuate.

2. INTRODUCTION

In this chapter we have assessed the degree of compliance of northern Australian catchments with the National Water Initiative. To assist in a comparative evaluation of the status of northern Australian water reform and management, we have also separately assessed all of the Northern Territory, Queensland and Western Australian catchments.

Water policy is often implemented at the catchment scale and focal catchment perspectives or understanding of water management cannot be presumed to be aligned or concordant with State wide differentiation or institutional diversity. More effective implementation that influences integrated water management may be reliant on mixes of sequenced instruments tailored to address temporally and spatially diverse water values and productivity.

The final section of the chapter assesses the status of water planning and management in the Mitchell, Fitzroy and Daly/Katherine focal catchments. An important focus of the chapter is to include institutional and policy evaluation at a scale that simultaneously aligns the biophysical and economic analysis presented in Sections 29a and 29b of the report. The analysis is intended to assist the Northern Australian Task Force to identify opportunities for water policy formulation that is administratively and politically feasible at the catchment scale.

2.1 Evaluation of NWI implementation in Northern Australian

Selected performance indicators of surface water management in northern Australia (NA) have been provided by State and Territory governments from data available up to 2005 in Appendix A and are summarised with the main points (2). This information is used as a means to audit and evaluate compliance with the intent of the NWI. Figure 1 and Table 1 indicate the NA catchments under consideration in reference to State/Territory compliance with NWI.



Figure 1. Overview of Tropical rivers of Australia
Source: TRaCK (2008) (6)

The NASY project (1) details 64 AWRC catchments while the Tropical Rivers and Coastal Knowledge (TRaCK) (3) describes 62 catchments in northern Australia. The total surface area management areas have been compiled from Australian Water Resources (2005) (4) updated by information from Larson

and Alexandridis (2009) (3). Figure 16 illustrates the 64 AWRC Surface Water Management Areas used in the Northern Australian Sustainable Yields (NASY) project.

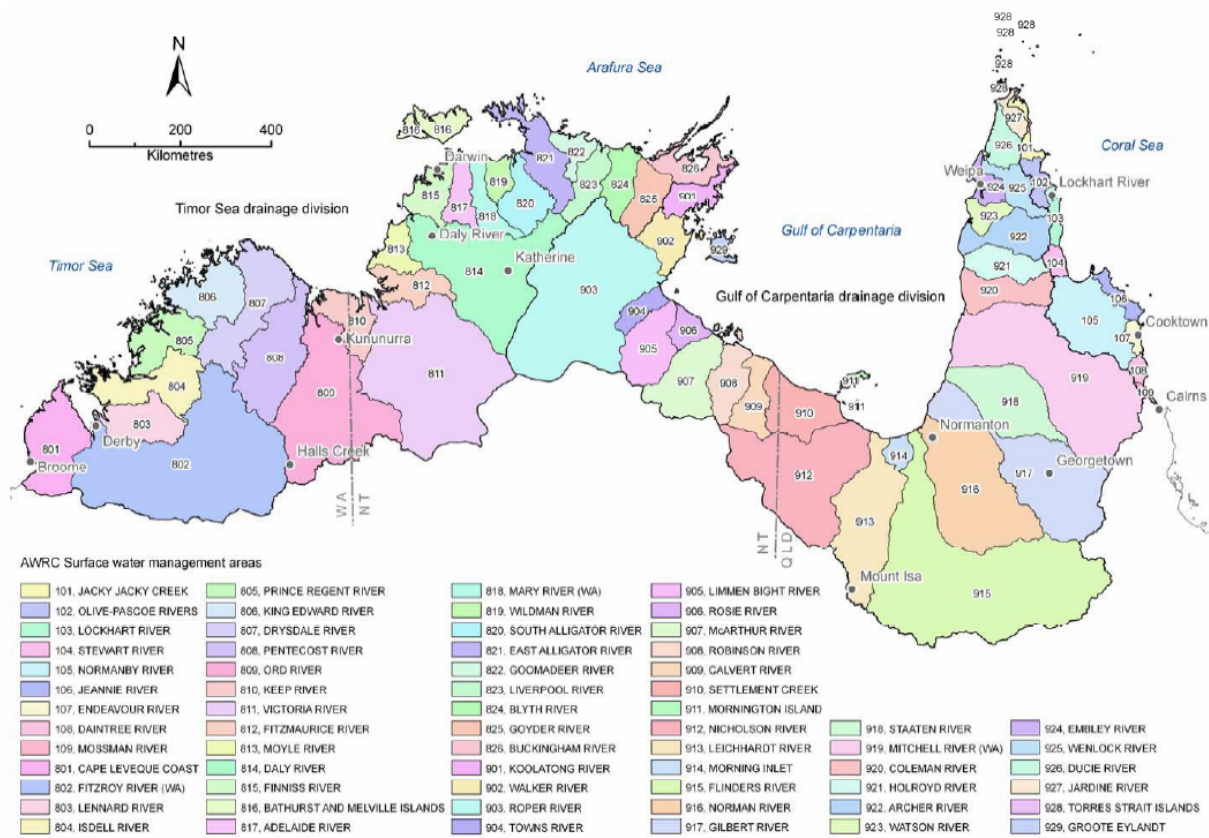


Figure 2 AWRC Surface water management areas

Source: CSIRO 2009

There are numerical discrepancies in the number of northern Australian catchments assessed by TRaCK and the NASY research. Additional scrutiny indicates that the Daintree, Jacky Jacky and Olive-Pascoe catchments were regarded as part of northern Australian catchments by the NASY project (1) but not by TRaCK (3). The NASY project also included the Jeannie and Mossman Rivers which were not mentioned by TRaCK. The TRaCK report mentioned Horne Island, Keep River, and Darwin / Blackmore Rivers while mentioning the Keep, Settlement Creek and Ord Rivers twice. The Gulf was included from information within this report and available on <http://www.nrw.qld.gov.au/water/index.html> (see Figure 9, Chapter 20).

Table 1. List of the Northern Australian Catchments

Catchments in alphabetic order (state)	Main settlement*	2006 population estimate**	Area (km²)
Adelaide River (NT)	-	2,090	7,462
Archer River (Qld)	Coen	298	13,820
Bathurst and Melville Islands (NT)	Bathurst and Melville Islands	2,127	7,485
Blyth River (NT)	Ramingining	2,440	9,219
Buckingham River (NT)	Nhulunbuy Gove	8,321	9,600
Calvert River (NT)	Clavert River Homestead	44	10,033
Cape Leveque Coast (WA)	Broome	13,062	22,956
Coleman River (Qld)	Pormpuraaw	656	12,861
Daly River (NT)	Katherine, Pine Creek	9,162	53,197
Darwin / Blackmore Rivers (Qld)		1,653	816
Drysdale River (WA)	-	77	25,999
Ducie River (Qld)		54	6,745
East Alligator River (NT)	Jabiru, Minjilang, Kunbarllanjnja	2,474	15,875
Embley River (Qld)	Weipa	3,551	4,622
Finniss / Elizabeth / Howard Rivers (NT)	Darwin	103,458	8,672
Fitzmaurice River (NT)	-	176	10,375
Fitzroy River (WA)	Derby, Fitzroy Crossing, Looma	6,870	93,830
Flinders River (Qld)	Hughenden, Cloncurry, Richmond	5,990	109,377
Gilbert River (Qld)	Georgetown	849	46,411

Goomadeer River (NT)	-	431	5,684
Goyder River (NT)		702	10,391
Groote Eylandt (NT)	Angurugu, Alyangula	2,357	2,362
Holroyd River (Qld)	-	27	10,287
Horne Island (Qld)	Horne Island	578	53
Isdell River (WA)	-	114	19,996
Jardine River (Qld)	Bamaga	1,682	3,282
Keep River (NT)		62	6,003
Keep River (WA)		367	5,847
King Edward River (WA)	Kalamburu	456	17,621
Koolatong River (NT)	-	555	7,913
Leichhardt River (Qld)	Mount Isa	19,540	32,878
Lennard River (WA)	Mowanium	122	14,757
Limmen Bight River (NT)	-	120	15,938
Liverpool River (NT)	Maningrida	2,157	8,945
Mary River (WA)	-	213	8,074
McArthur River (NT)	Borroloola	963	20,023
Mitchell River (Qld)	Kowanyama, Mt Mulgrave, Chillagoe	5,656	71,471
Morning Inlet (Qld)	-	116	3,679
Mornington Island (Qld)	Mornington Island		1,001
Moyle River (NT)	Thamarrurr, Nganmarriyanga	2,443	7,085
Nicholson River (NT)		63	15,773
Nicholson River (Qld)	Domadgee, Burketown	1,578	35,728
Norman River (Qld)	Karumba, Normanton, Croydon	2,010	50,444
Ord River (NT)		51	11,356
Ord River (WA)	Kununurra, Warmun	7,075	44,121
Pentecost River (WA)	-	206	29,145
Prince Regent River (WA)	-	27	15,432
Robinson River (NT)	-	214	11,369
Roper River (NT)	Mataranka, Roper River	3,370	79,617
Rosie River (NT)	-	51	5,044
Settlement Creek (NT)		20	5,493
Settlement Creek (Qld)	Wollogorang Homestead	62	11,883
South Alligator River (NT)	Munmarlay	238	11,917
Staaten River (Qld)	Inkerman Homestead	53	25,732
Thursday Island (Qld)	Thursday Island	2,315	3
Towns River (NT)	-	15	5,432
Victoria River (NT)	Dagaragu, Timber Creek	1,808	78,144
Walker River (NT)	Numbulwar	847	9,731
Watson River (Qld)	Aurukun	1,033	4,679
Wenlock River (Qld)	-	152	7,525
Wildman River (NT)	-	106	4,818

*based on Stoeckl et al., 2006

** based on Carson et al., 2009 and Census data recalculations

Source: Larson and Alexandridis (2009) (3).

2.2 Northern Territory Basins

Forty Surface Water Management Areas (SWMAs) have been defined in the Northern Territory and of these 29 basins are designated as part of the Tropical river system of northern Australia (5; 3). Table 2 indicates the planning in all basins and contrasts with those of the tropical river system.

Table 2. Water planning in Northern Territory and Northern Australian Tropical River Basins in NT for water allocation plans

Water planning status	All NT basins	NT NA basins
Finalised full coverage	3	1*
Statewide policy	36	21
Draft	2	1**
In progress	1	2***
Not planned but identified as requiring a plans		
Unknown/ no plans		4
Total	40	29
*Daly River: Katherine Water Allocation Plan (Tindall Limestone Aquifer)		
** Daly River: Oolloo and Mataranka, to be completed in 2010		
*** Darwin / Blackmore Rivers		
No integrated management plan and/or environmental flows plans		
Water resource caps on surface water usage / abstraction on each surface water management area have been provisionally placed on all basins.		
Surface water and groundwater interaction		
One area has been managed as an integrated water resource, in Daly River where groundwater models in Tindal and Oolloo and areas are in progress, otherwise groundwater has not been factored in.		
Surface water and groundwater managed as integrated resource: For the Daly, groundwater models in Tindal and Oolloo areas in progress.		
Estimated sustainable yield: For 2004/05 for the 40 basins ranged from range 0- 1,110,000ML and the average value was 279,442.5 ML. For the 25 Northern Australian basins in the Northern Territory the range is 0- 950,000 ML and average value of 332,352 ML		
Level of entitlements relative to the sustainable yield: Level of entitlements relative to the sustainable yield was at a low level of development for all basins.		
Level of diversions relative to the sustainable yield: Level of diversions relative to the sustainable yield was at a low level of diversions (0 - 29%) for all basins		
Environmental water requirements: Assessed for the Daly River with a complete coverage of the surface management area.		
Formal environmental water provisions for regulated rivers: Completed for the Daly region only		

2.2.1 NWI compliance

The Northern Territory has one finalised plan for the Katherine Tindall and two in progress for the Oolloo aquifer in the Daly and the Tindall aquifer at Mataranka., These are treated as an integrated surface-ground water resource. All water caps are provisional; there is no significant development towards compliance of surface water management with the NWI.

2.3 Queensland Basins

Fifty four basins as designated by the Australian Water Resources Council (AWRC) have generally been adopted as a reporting unit of all Queensland basins. A number of these basins have been further subdivided to smaller areas that reflect operational areas within the basin (107 in total). Water planning status and availability of plans of 54 basins has been reported in 2005 and summaries are presented as well as comments on the Queensland basins of the tropical river system. Additional basins have been included by Larsen and Alexandrisis (2009) in this assessment to cover basins in the tropical river system not identified by the earlier 2005 report. Amongst the 22 tropical basins, two have approved Water Resource Plans and Draft Resource Operations Plans: the Gulf and the Mitchell. Note that the Gulf is comprised of 9 sub catchments that are included in the total catchments of northern Australia. It is unclear how water resource caps are determined for individual catchments. Table 5 indicates the planning in all basins and contrasts with those of the tropical river system.

Table 3 Water planning in Queensland and Northern Australian Tropical River Basins in QLD for water resource plans

Water planning status	All QLD basins	QLD NA basins
Finalised full coverage	20	2 *(10)
Statewide policy	21	7
Draft	2	1
In progress	4	1
Not planned but identified as requiring a plans	5	-
Unknown/ no plans	15	3
Total	67	14 (22)
* The Gulf is comprised of 9 sub catchments managed by one water Resources Plan		
Integrated management plan and/or environmental flows (26) of which 8 basins had more than 1 plan, all available on internet.		
Water resource caps	All QLD basins	QLD NA basins
Yes/Provisional	12	2 (10)
Yes/Absolute	7	
No cap/not assessed	35	19
Surface water and groundwater interaction		
No/not assessed	48	20
Yes**	6	

Surface water and groundwater managed as integrated resource		
No	48	
Estimated sustainable yield: Not assessed for any basins		
Level of entitlements relative to the sustainable yield was not assessed or no data was available.		
Level of diversions relative to the sustainable yield was had not been assessed.		
Environmental water requirements		
Not assessed	43	18
Complete coverage assessed	11	2
Formal environmental water provisions for regulated rivers		
Completed	16	-

* The Gulf comprises 9 NA sub-catchments

* Yes (6)- though may not be implemented (1), with licensing entitlements (1) or combined surface water and groundwater management plans (1)

2.3.1 NWI compliance

In the 2005 Water Resources Assessment (2), Queensland identified 54 surface water management areas (SMAs) of which 26 integrated management plan and/or environmental flow reports available. Statewide policy rather than any planning has been applied to 21 of SMAs. Water caps have been designated for 19 SMAs. Largely, surface water management has not been integrated with groundwater management. Environmental water requirements have only been assessed for 11 SMAs. Environmental water provisions for regulated rivers have been conducted in 16 of basins. There appears to have been significant attempts at managing surface areas and ensuring compliance with the NWI.

For the tropical rivers in northern Australia there is a Water Resources plan for the Gulf¹ and one for the Mitchell River, which has been detailed in the following focal catchment section. The additional catchments described by Larsen and Alexandridis (3) indicated that the Gulf region had been subject to further planning during 2006-2007.

¹ http://www.nrw.qld.gov.au/wrp/pdf/gulf/gulf_draft_rop_summary.pdf

2.4 Western Australia Basins

Forty one surface water management areas have been adopted as the reporting unit for WA. These surface water management areas coincide with the Australian Water Resources Council (AWRC) basins.

Table 4 Water planning in Western Australia and Northern Australian Tropical River Basins in WA

Water planning status*	All WA basins	NA WA basins
Finalised full coverage	1	
Statewide policy	1	1
Draft	1	1
In progress	8	1
Not planned but identified as requiring a plans	14	1
Not planned NOT requiring a plan	10	6
Unknown/ no plans	1	1
Other	5	
Total	41	11
Environmental flow reports (3) available and Ord River Water Management Plan (2006-2008) and the La Grange Groundwater Sub Area Water Management Plan (2008)		
Water resource caps: - Land use and management information, along with information of the use and sustainability of the water resource, guides the decision making process to set appropriate limits on abstraction. Implemented via limits on licensed diversions.		
Surface water and groundwater interaction		
No/not assessed	36	
Yes*	5	
Surface water and groundwater managed as integrated resource: No		
Estimated sustainable yield: For 2004/05 for the 40 basins ranged from range 0- 1,294,100 ML and the average value was 120,184.75 ML.		
Level of entitlements relative to the sustainable yield		
<ul style="list-style-type: none"> • Low development (36) • High development (4) • Over-allocated (1) 		
<ul style="list-style-type: none"> • Level of diversions relative to the sustainable yield: • Low diversions [0 - 29%] (36) • Moderate diversions [30 - 69%] (4) • High diversions [70 - 100%] (1) 		

Environmental water requirements: Western Australian plans specify processes to determine minimum environmental flows.		
Formal environmental water provisions for regulated rivers:		
Partial coverage	11	
In review	1	

* Six non-statutory (non-NWI consistent) plans are in place. These will be transitioned to statutory plans once the enabling legislation is passed. All statutory plans are due to commence by 2011 (7).

* The 5 completed groundwater management plans are driven by surface water flows (4), and separate surface water and groundwater management plans (1, 7).

* Although Western Australian allocation plans are often referred to as non-statutory, the current Act allows for the development of statutory regional, sub-regional and local management plans. New legislation reform proposes regional water plans and statutory water management plans. These are in progress for the Kimberley region. Generally, the licensing provisions of the existing Act have been relied on to manage water resources (20).

2.4.1 NWI compliance

Western Australia with 41 designated SMAs has one drafted water plan with 9 water plans in progress. Another 14 are not planned as yet but have been identified as requiring a plan. Significantly, 10 of SMAs are not planned and don't require a plan and have other uses. There are no completed integrated management reports for northern basins (20). Three environmental flow reports, notably for the Ord River, have been completed and are currently available. All Western Australian plans specify processes to determine and maintain minimal environmental flows. While Western Australian allocation plans largely focus on either surface water or groundwater for management purposes, provisions are in train to account for the connectivity between surface and groundwater. According to Hampstead et al. (20 p.44, 21 pp.36-43) ground-surface water connectivity in the Ord plan was not addressed and considered to be insignificant. The current Ord management plan is not a statutory plan, nor does it follow the processes specified in the current Act for sub-regional plans (20), or align with the intent of water planning reform agenda. It does however establish a valuable, descriptive basis for future statutory planning efforts. By establishing sustainable diversion limits, the current plan effectively sets an extraction cap and as a corollary, acceptable environmental impacts.

The level of entitlements and diversions relative to the sustainable yield were largely of low development, however four were highly developed with one example of over-allocation at the Swan Coast. There have been developments towards compliance of surface water management with the NWI.

An update on progress indicates a number of water allocation plans have already been developed, or are underway (20, 21). The Ord River water allocation plan 2006, provides the basis for determining a prescriptive, environmental water regime and a revised draft plan is anticipated to be released in 2010 to support the Ord expansion project.

The draft La Grange Groundwater Sub Area Water Management Plan was released in 2008 for comment (8; 9). The plan is designed to maintain groundwater *in situ* in order to protect dependent ecosystems, cultural values and the saltwater interface.

The state of planning in the Northern Territory, Queensland and Western Australia in relation to compliance with NWI directives is depicted in Figure 3 for all basins and in Figure 4 for northern Australian basins.

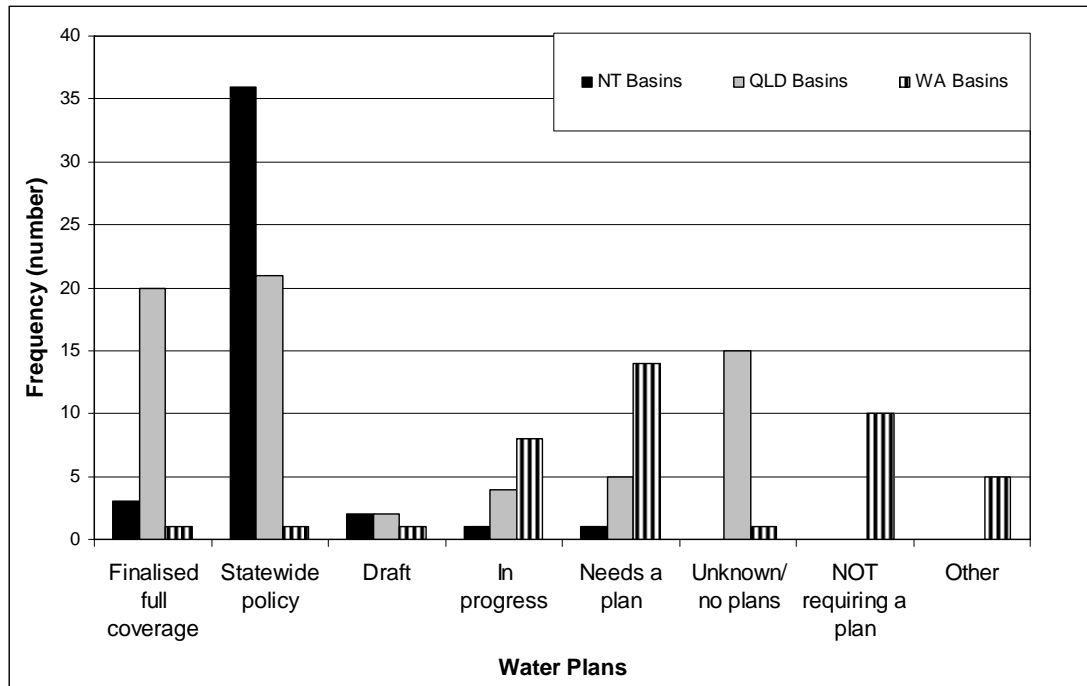


Figure 3. Frequency of policy plans, in planning stage and operational plans for all Basins in Northern Territory, Queensland and Western Australia

Source: http://www.water.gov.au/RegionalWaterResourcesAssessments/index.aspx?Menu=Level1_7 and Larsen and Alexandridis (2009) (3) and NWC (2009) (7).

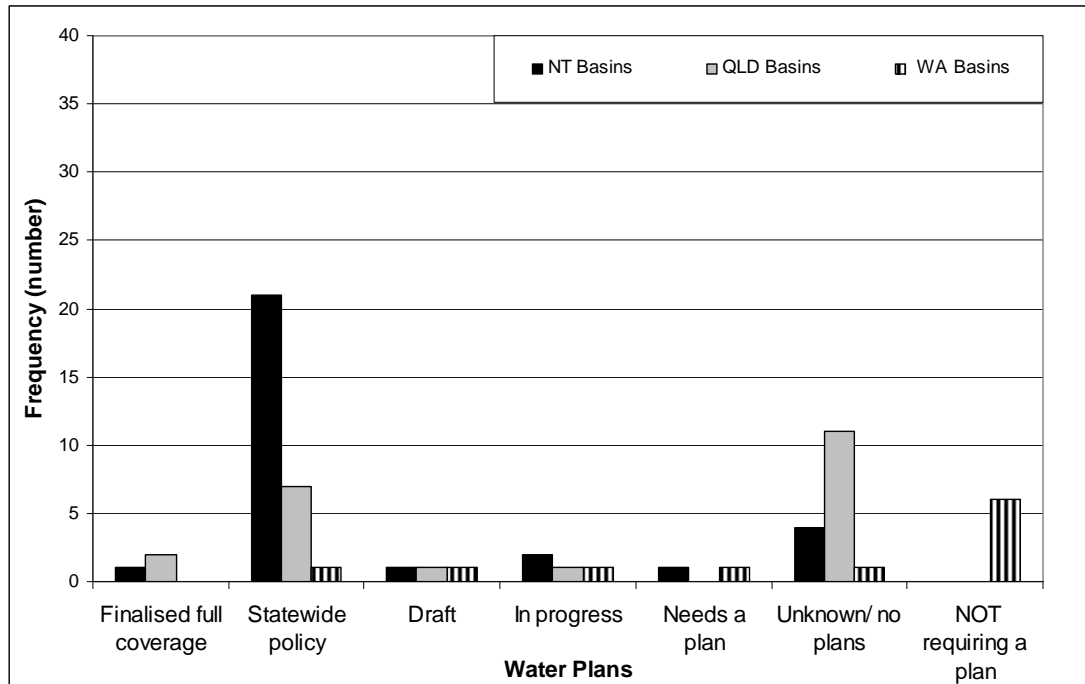


Figure 4. Frequency of policy plans, in planning stage and operational plans in Northern Australian basins in Northern Territory, Queensland and Western Australia

Source: http://www.water.gov.au/RegionalWaterResourcesAssessments/index.aspx?Menu=Level1_7 and Larsen and Alexandridis (2009) (3) and NWC (2009) (7).

2.5 Focal catchments

Three catchments have been selected to describe in detail compliance with the NWI in Northern Territory, Queensland and Western Australia.

2.5.1 Daly River Catchment in Northern Territory

The Daly River Catchment exhibits extensive areas of natural landscapes; breeding areas and wildlife habitat, especially of fish, turtles and waterbirds; and it supports a number of threatened plant and animal species (10). The Daly Roper Water Control District (WCD) was declared in 2008, allowing a greater level of water management such as:

- All groundwater and surface water extraction, excluding for stock and domestic purposes, must be licensed;
- Bore construction permits with minimum construction standards designed to prevent contamination are required;
- Water allocation plans can be declared.

The water resources of the Daly-Roper region are depicted in Figure 5.

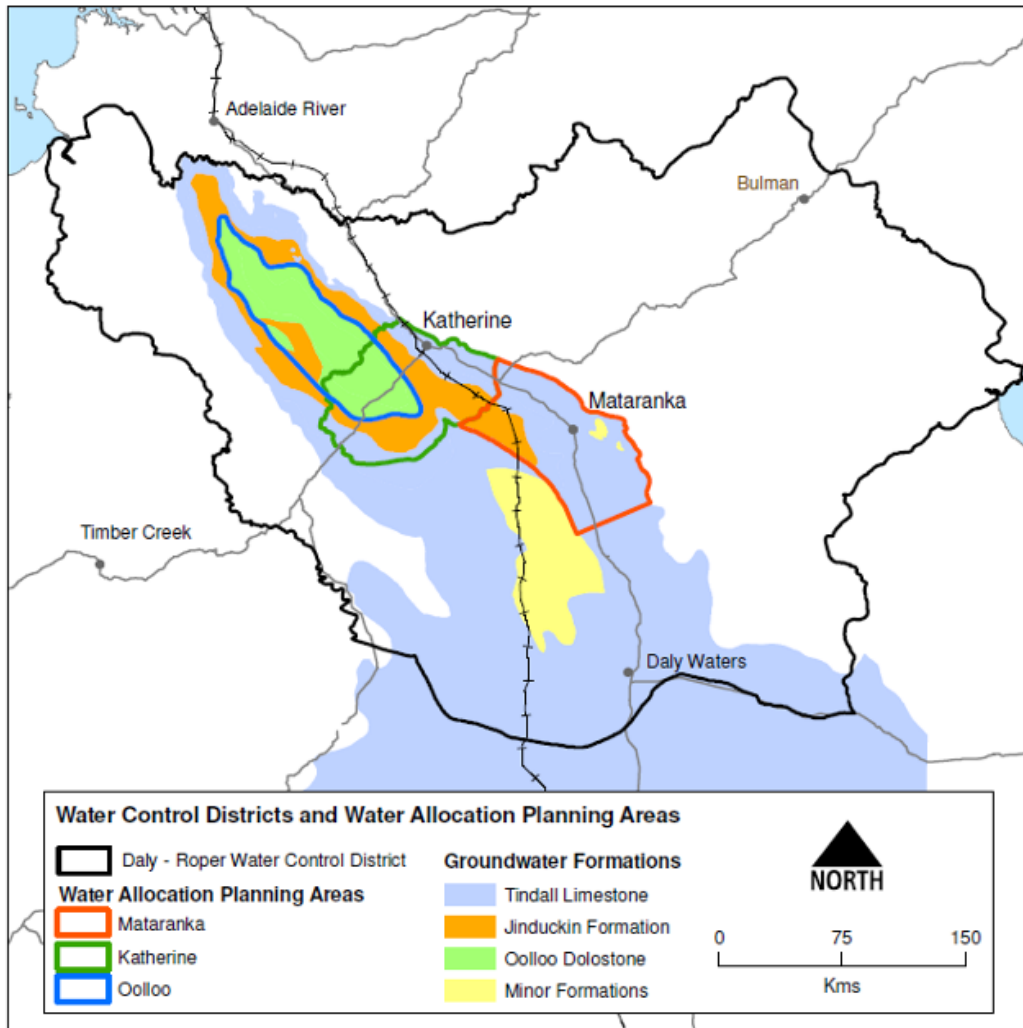


Figure 5 Water resources Daly-Roper region

Source: http://www.nt.gov.au/nreta/water/mwac/pdf/mwap_situationanalysis.pdf

Water allocation plans (WAPs) completed or under development in the Daly-Roper WCD shown in Figure 5 include:

- The Tindal Limestone aquifer (Katherine) WAP for all water from the Tindal aquifer flowing toward the Katherine River (completed);
- The Tindal Limestone aquifer (Mataranka) WAP for all water from the Tindal aquifer flowing toward the Mataranka hot springs; and
- The Ooloo Dolostone aquifer WAP for all water confined within the Ooloo aquifer in the Daly Region.

Benefits of the Water Allocation Plan for the Tindal Limestone Aquifer, Katherine plan include:

- Assignment of 73 licenses with defined level of security;
- Water trading in the plan area;

- Introduction of standards and procedures to protect water quality;
- Sustainable management of discharge from the Tindall Aquifer to the Katherine River;
- Consideration for Indigenous uses and values; and
- Protection for groundwater dependent ecosystems, such as the Katherine Hot Springs

The planning processes for the Ooloo aquifer in the Daly Region, Tindal aquifer in the Mataranka region and the Howard East aquifer in the Darwin rural region commenced in 2008. The Mataranka planning area has expanding water consumptive industries including irrigated agriculture, cement manufacturing, pastoral operations and watering of green space for camp grounds and schools, all of which use groundwater for their water supply. The area also possesses numerous pristine groundwater dependent ecosystems (GDEs). A WAP is being developed to protect the identified GDEs, provide security for water users and define rules to allow the sustainable development (11).

2.5.2 Mitchell Catchment in Queensland

The *Water Resource (Mitchell) Plan 2007* applies to water in watercourses, lakes, springs not connected to Great Artesian Basin (GAB) artesian water or GAB sub-artesian water, water collected in dams and weirs built across watercourses, water from aquifers, and overland flow water throughout the plan area (12). The draft plan provides for the release of 70 000 ML of additional unallocated water throughout the plan area to meet future water demands. The draft plan also provides for granting and converting authorisations and sets out rules for managing water taken under un-supplemented licences and how water licence applications and overland flow water will be dealt with. There is also provision for seasonal trading of water taken under licences in the Upper Mitchell River sub-catchment. Figure 6 depicts the Mitchell water resource planning area. A volume of 20 000 ML/a of general reserve water set aside for the upper reaches of the Mitchell River could, subject to there being sufficient demand and any proposals meeting specified criteria, be made available to allow water to be drawn from existing water infrastructure such as Southedge Dam (or Lake Mitchell).

The Indigenous reserve has been set aside to assist Indigenous communities in the Cape York Peninsula region achieve their social and economic aspirations, as outlined in the *Cape York Peninsula Heritage Act 2007*.

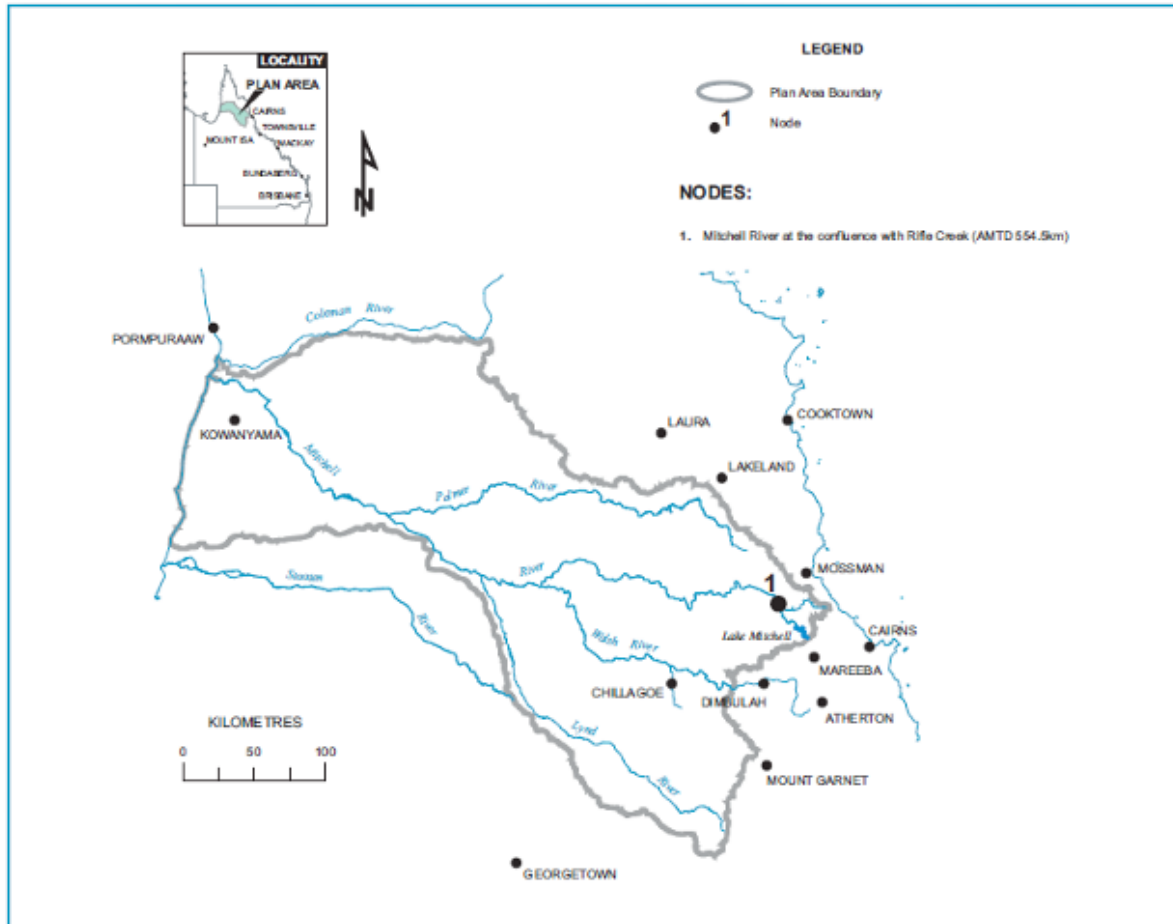


Figure 6 Mitchell water resource planning area

Source: http://www.nrw.qld.gov.au/wrp/pdf/mitchell/mitchell_draft_rop_summary.pdf

2.5.3 Fitzroy Catchment in Western Australia

Western Australia's Kimberley region has approximately 30 major rivers and is one of the world's last remaining natural river systems (13). The river systems are under increasing pressure from threats such as weeds, overgrazing, new roads, tourism, feral animals, increased mining and exploration activity and inappropriate use and development. There are also significant groundwater resources, supply key mining operations, pastoral activities, town water supplies and a large number of irrigation and industrial operations.

The Fitzroy River in the Kimberley is located between Broome and Derby and discharges into King Sound. The catchment is approximately 93,000 square kilometres. The major tributary, the Margaret River joins the Fitzroy upstream of Fitzroy Crossing (Fig. 7) (14). The Fitzroy surface water - groundwater interaction project (2007-2010) has been designed to assist government policy and water planning and increase understanding of the links between surface water and groundwater systems in tropical environments.

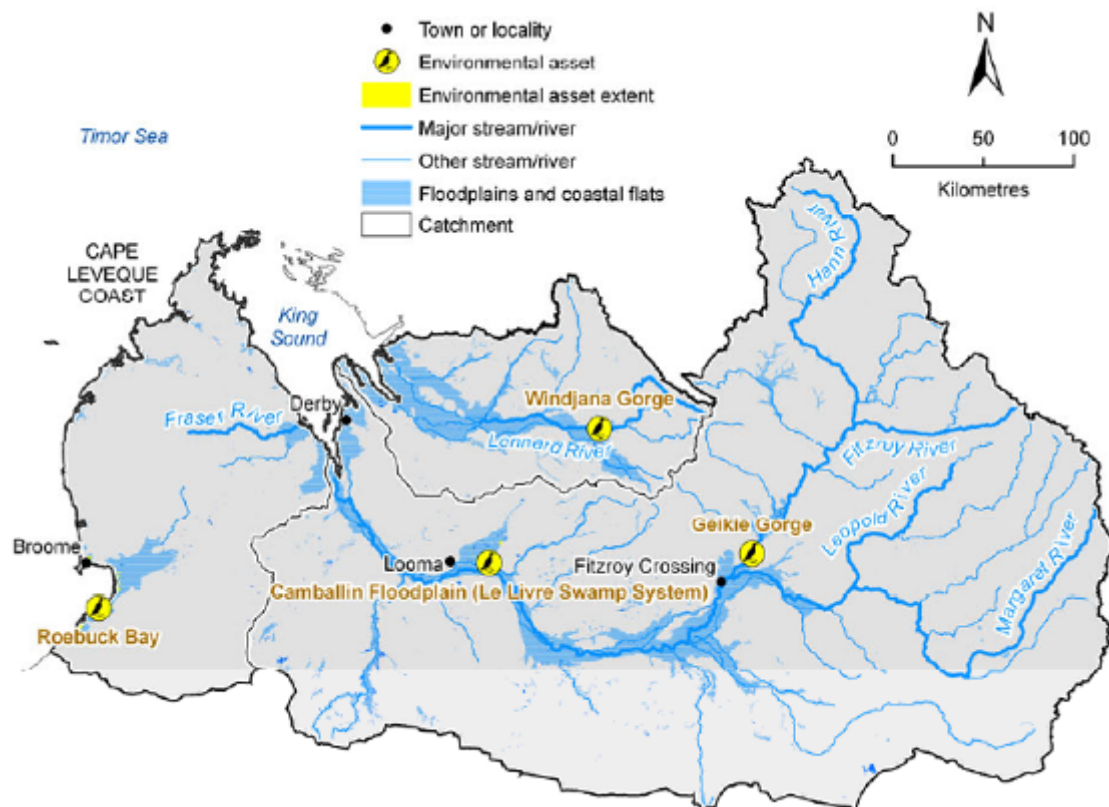


Figure 7 The Fitzroy River catchment

Source: <http://www.csiro.au/files/files/psi4.pdf>
<http://www.water.wa.gov.au/firstdowPublic/DocViewer?id=39291>

A strategic Kimberley Regional Water Plan is currently being developed by the Department (commenced in 2008) and a draft “released for comment” is due in mid 2010. As a broad strategic plan supporting a regional framework, the water allocation plan guides water allocation decisions, water information, planning, waterways management and licensing policy for individual water resources and sub-regions (e.g. La Grange groundwater basin, the Ord River) within the Kimberley (1). Regional allocation plans are to determine priority uses for ecologically sustainable outcomes by taking into account environmental, ecological and social values, including beneficial uses of surface and groundwater resources. The *State Water Plan (2007)* supports the allocation plan by devolving strategy and frameworks.

The *La Grange Groundwater Subareas Water Management Plan – Allocations* describes principles and policies that guide water licensing. The La Grange subareas cover approximately 100,000 km² in the southern boundary of the Fitzroy (WA) region adjacent to the coast and contain two aquifers, the unconfined, shallow Broome Sandstone Aquifer (allocation limits of 50 GL/year) and the underlying Wallal Sandstone Aquifer (1). Increasing demand on water supplies is expected due to expansion of horticulture (pastoral diversification) along the coast and possible expansion of mining activities in the south (outside the area covered by this project). Development in the Cape Leveque Coast area, north of Broome, has high tourism and indigenous values and is a possible site for development of an off-shore gas field.

Inter-basin transfer water from the Fitzroy River for Perth was found to be **cost-prohibitive**, while water transfer now occurs for rural and remote communities with small-scale irrigation, mainly for fodder crops (1).

A Water Quality Protection Plan exists for the area around Fitzroy Crossing to protect the drinking water supply for the area. While groundwater quality appears to be favourable, the available hydrogeological data are limited and the analysis of likely yields is preliminary with more research into the extent and properties of the aquifers prior to confirming a sustainable extraction yield.

Current groundwater extraction licences amount to 20.63 GL/year. These licences range from small community water supplies (<10 ML/year) to larger mining supplies (~4000 ML/year) (1). The majority of allocations are for water extraction from the Canning Basin aquifers. Pumping from bores screened in aquifers below the Fitzroy alluvium (e.g. at Fitzroy Crossing) are expected to influence water levels in the overlying alluvial aquifer. Demand for water in Broome, Derby and Fitzroy Crossing is expected to increase particularly in light of future development and mining activities.

To date there are no plans for damming the Fitzroy River, rather the focus has been on small-scale distributed irrigation developments using alluvial groundwaters. Changing water access and storage will require considerable additional assessment and stakeholder consultation. Development of suitable conservative allocation limits (or where appropriate, consumptive pools) will be essential to development activities in the region.

The granting of licences under the *Rights in Water and Irrigation Act 1914* is the main management tool for accounting for the water taken (1). To account for the water taken from unlicensed groundwater users, the department will set aside sufficient water before allocations are made to licensed water users, ensuring sustainable outcomes.

2.5.4 Power-law distribution and its relevance to the north

Research by Larsen and Alexandridis (3) on socio-economic profiling of tropical rivers suggests that graphical distributions of factors display classical power-law distributions as represented in Figure 8, where approximately 80% of frequencies account for 20% of magnitude or effect (also known colloquially as the 80:20 rule). Power-law distributions relate frequency and size, with small occurrences that are extremely common and large occurrences that are extremely rare. Many man-made and naturally occurring phenomena are distributed according to a power-law distribution, from city sizes to earthquake magnitudes (15; 16). Power-law distributions arise in social systems where there are multiple options and preferences. Freedom of choice is linked to diversity of choices and creates inequality, and the greater the diversity, the more extreme the inequality (15; 17; 18; 19).

Larsen and Alexandridis (3) claim northern Australia may be influenced by preferential attachment, where distributions can be largely amongst a number of individuals, according to how much they already have and those with more, gain more than those without. In the case of the north, this would mean that any benefit generated in the future (i.e. financial benefit, increase in the labour force, increase in numbers of community organisations, etc.) would disproportionately benefit already developed catchments such as Finniss, Mitchell and Flinders, thus widening the gap between them and smaller, poorer or less developed catchments. Similarly, exponential growth is required to improve the situation. For example, the size of labour force in Darwin may have to increase 10-fold before labour force size in one of the smaller catchments doubles. Further research into power-law distributions across social and economic systems in northern Australia is required to better understand growth trajectories and potential in certain areas or catchments.

The current state of water planning in the Northern Territory and Western Australia, is characterised by a region of many basins with very few developed plans basins and may correspond to preferential

attachment predicted by the power law. That is, those catchments with developed plans and prescribed water for consumptive use may be subject to accelerated demand to assign water interests. Hence vigilance and a cautionary approach would be warranted to ensure an over assigned water system and excess infrastructure demand does not eventuate.

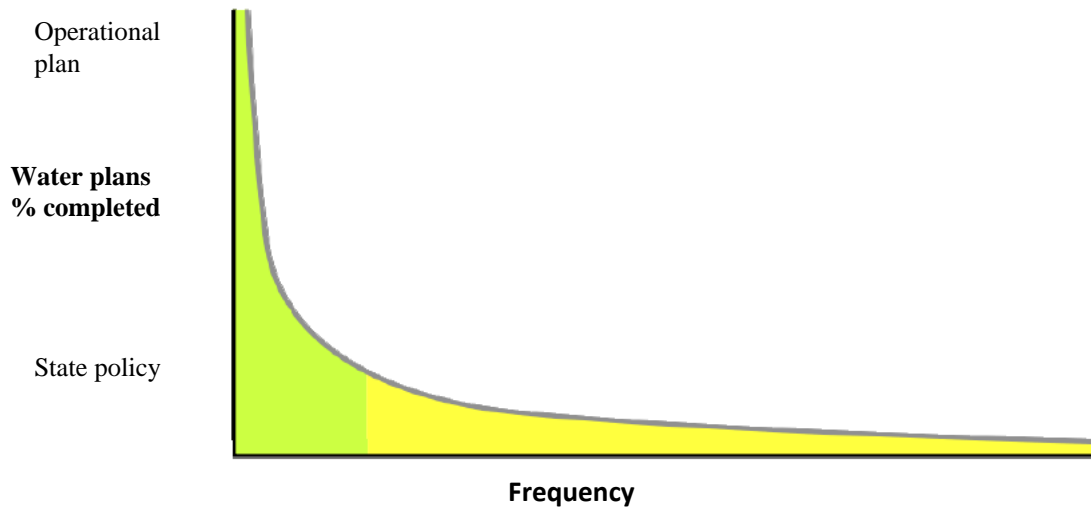


Figure 8. Classical power-law distribution curve where roughly 80% of frequencies account for 20% of magnitude or effect (yellow area)

Source: Larsen and Alexandris (2009) (3)

3. SUMMARY

The National Water Initiative (NWI) is the primary instrument of water reform setting out objectives, outcomes, timelines and actions to guide reforms by States and Territories. Overall the progress towards NWI compliance by the northern Australian States has been slow and subject to regional variation. Water plans are in various stages of completion and many northern Australian basins have either water plans in progress, or are subject to rudimentary or non-existent plans. Assessments of progress in water reform suggest agencies in all jurisdictions have been struggling to meet the challenge of water planning.

In the region defined as northern Australia, The Northern Territory has one allocation plan, the Katherine Draft Water Allocation Plan (Tindal Limestone Aquifer) for the Daly River. There is little development towards compliance of surface water management within the NWI guidelines. There have been numerous water allocation plans for groundwater use. Water resource planning in Queensland is conducted according to a clear, transparent and well-articulated framework that is defined by both the legislation and supporting policy documents and has made significant attempts at managing surface water areas. Water planning and implementation in Queensland is generally more advanced, with water resource plans being developed and implemented for all but a few of Queensland's catchments. Western Australia has a number of water allocation plans already developed, or are underway, including the Ord River Water Management Plan (2006) and the draft La Grange Groundwater Sub Area Water Management Plan. Overall the progress towards NWI compliance by the northern Australian States has been slow and subject to regional variation.

The current state of northern Australia water planning is characterised by many unplanned basins with developed plans for only a few basins. Water planning corresponds to a power law distribution, which predicts preferential attraction, where those with more (planning) gain more than those without. Water related development may be accelerated and rapid in basins with completed water plans. Hence a cautionary approach is warranted to ensure over-assigned water systems and excess demand on infrastructure does not eventuate. If this occurs this simply repeats the mistakes experienced in the Murray Darling Basin.

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APPENDIX A

Summary of Australian Basins in Northern Territory, Queensland and Western Australia

Basin * denotes NA Basin	Water planning status	Water resource caps	Surface water / groundwater interaction	Surface water sustainable yield (ML)	level of entitlements relative to the sustainable yield	Environmental water requirements	Formal environmental water provisions for regulated rivers *	Level of diversions relative to the sustainable yield?	Integrated management plan/environmental flows
NORTHERN TERRITORY									
Adelaide River*	Statewide policy	Yes/provisional	No	310000	Low development	No	No	Low level (0 - 29%)	
Barkly	Statewide policy	Yes/provisional	No	30000	Low development	No	-	Low level (0 - 29%)	
Bathurst and Melville Islands*	Statewide policy	Yes/provisional	No	588000	Low development	No	-	Low level (0 - 29%)	
Blyth River*	Statewide policy	Yes/provisional	No	220000	Low development	No	-	Low level (0 - 29%)	
Buckingham River*	Statewide policy	Yes/provisional	No	440000	Low development	No	-	Low level (0 - 29%)	
Burt	Statewide policy	Yes/provisional	No	3800	Low development	No	-	Low level (0 - 29%)	
Calvert River*	Statewide policy	Yes/provisional	No	180000	Low development	No	-	Low level (0 - 29%)	
Daly River*	In progress	Yes/provisional	Yes Groundwater models in Tindal and Ollolo areas in progress.	1110000	Low development	Yes - complete coverage	Yes	Low level (0 - 29%)	
Darwin / Blackmore Rivers	Not planned but identified as requiring a plan	Yes/provisional	No	70000	High development	No	No	Low level (0 - 29%)	
East Alligator River*	Statewide policy	Yes/provisional	No	900000	Low development	No	-	Low level (0 - 29%)	
Finke River	Statewide policy	Yes/provisional	No	8000	Low development	No	-	Low level (0 - 29%)	
Finniss / Elizabeth / Howard Rivers*	Statewide policy	Yes/provisional	No	480000	Low development	No	-	Low level (0 - 29%)	
Fitzmaurice River*	Statewide	Yes/provisional	No	280000	Low development	No	-	Low level (0 - 29%)	

Georgina River	policy	nal							
	Statewide policy	Yes/provisio nal	No	125000	Low development	No	-	Low level (0 - 29%)	
Goomadeer River*	Statewide policy	Yes/provisio nal	No	490000	Low development	No	-	Low level (0 - 29%)	
Goyder River*	Statewide policy	Yes/provisio nal	No	302800	Low development	No	-	Low level (0 - 29%)	
Groote Eylandt*	Statewide policy	Yes/provisio nal	No	130000	Low development	No	-	Low level (0 - 29%)	
Hay River	Statewide policy	Yes/provisio nal	No	7000	Low development	No	-	Low level (0 - 29%)	
Keep River*	Statewide policy	Yes/provisio nal	No	78000	Low development	No	-	Low level (0 - 29%)	
Koolatong River*	Statewide policy	Yes/provisio nal	No	310000	Low development	No	-	Low level (0 - 29%)	
Limmen Bight River*	Statewide policy	Yes/provisio nal	No	300000	Low development	No	-	Low level (0 - 29%)	
Liverpool River*	Statewide policy	Yes/provisio nal	No	570000	Low development	No	-	Low level (0 - 29%)	
Mackay	Statewide policy	Yes/provisio nal	No	1100	Low development	No	-	Low level (0 - 29%)	
Mary River	Statewide policy	Yes/provisio nal	No	400000	Low development	No	-	Low level (0 - 29%)	
McArthur River*	Statewide policy	Yes/provisio nal	No	630000	Low development	No	-	Low level (0 - 29%)	
Moyle River*	Statewide policy	Yes/provisio nal	No	110000	Low development	No	-	Low level (0 - 29%)	
Nicholson River*	Statewide policy	Yes/provisio nal	No	134000	Low development	No	-	Low level (0 - 29%)	
Ord River*	Statewide policy	Yes/provisio nal	No	166000	Low development	No	-	Low level (0 - 29%)	
Robinson River*	Statewide policy	Yes/provisio nal	No	180000	Low development	No	-	Low level (0 - 29%)	
Roper River*	Statewide policy	Yes/provisio nal	No	950000	Low development	No	-	Low level (0 - 29%)	
Rosie River*	Statewide policy	Yes/provisio nal	No	90000	Low development	No	-	Low level (0 - 29%)	
Settlement Creek*	Statewide policy	Yes/provisio nal	No	160000	Low development	No	-	Low level (0 - 29%)	
South Alligator River*	Statewide policy	Yes/provisio nal	No	0	Low development	No	-	Low level (0 - 29%)	
Todd River	Statewide policy	Yes/provisio nal	No	4000	Low development	No	-	Low level (0 - 29%)	
Towns River*	Statewide policy	Yes/provisio nal	No	100000	Low development	No	-	Low level (0 - 29%)	
Victoria River*	Statewide	Yes/provisio	No	560000	Low development	No	-	Low level (0 - 29%)	

Walker River*	policy	nal							
	Statewide policy	Yes/provisio nal	No	660000	Low development	No	-	Low level (0 - 29%)	
Warburton	Statewide policy	Yes/provisio nal	No	not assessed	Low development	No	-	no data	
Wildman River*	Statewide policy	Yes/provisio nal	No	60000	Low development	No	-	Low level (0 - 29%)	
Wiso	Statewide policy	Yes/provisio nal	No	40000	Low development	No	-	Low level (0 - 29%)	
Basin	Water planning status	Water resource caps	Surface water / groundwater interaction	Surface water sustainable yield	level of entitlements relative to the sustainable yield	Environm ental water requireme nts	Formal environme ntal water provisions for regulated rivers *	Level of diversions relative to the sustainable yield?	Integrated management plan/environmental flows
Queensland									
Archer*	Statewide policy	No/not assessed	No	not assessed	no data	No	No	no data	
Baffle	Statewide policy	No/not assessed	No	not assessed	no data	No	No	no data	
Barron	Final - full coverage	Yes/absolut e	Yes :Not implemented yet	not assessed	no data	Yes - complete coverage	Yes	no data	http://www.nrw.qld.gov.au/wrp/barron_ro p.html
Black	Statewide policy	No/not assessed	No	not assessed	no data	No	No	No data	
Border Rivers	Final - full coverage	No/ not assessed	No	not assessed	no data	No	Yes	no data	http://www.nrw.qld.gov.au/wrp/catchment s.html
Boyne	Final - full coverage	Yes/provisio nal	No	not assessed	not assessed	Yes - complete coverage	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchment s.html
Bulloo	Final - full coverage	Yes/absolut e	No	not assessed	not assessed	Yes - complete coverage	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchment s.html
Burdekin	In progress	Yes/provisio nal	No	not assessed	not assessed	No	No	not assessed	http://www.nrw.qld.gov.au/wrp/catchment s.html
Burnett	Final - full coverage	Yes/provisio nal	Yes: Combined surface water and groundwater management plans allowing for short term and long term impacts	not assessed	not assessed	Yes - complete coverage	Yes	No data	http://www.nrw.qld.gov.au/wrp/burnett.html http://www.nrw.qld.gov.au/wrp/catchment s.html
Calliope	Draft	Yes/provisio nal	No	not assessed	not assessed	No	No	not assessed	http://www.nrw.qld.gov.au/wrp/catchment s.html

		nal							ov.au/wrp/catchment s.html
Coleman*	Statewide policy	No	No	not assessed	not assessed	No	No	No data	
Condamine-Balonne	Final - full coverage	No	No	not assessed	not assessed	No	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
Cooper Creek	Final - full coverage	No	No	not assessed	not assessed	No	No	No data	http://www.legislation.qld.gov.au/LEGISLATION/CURRENT/W/WaterReCCP00.pdf
Daintree	Not planned irequiring plan	No	No	not assessed	not assessed	No	No	No data	
Darwin / Blackmore Rivers*	N/A								
Don	Statewide policy	No	No	not assessed	not assessed	No	No	No data	
Ducie*	-	-	-	not assessed	-	-	-	No data	
Embley*	Statewide policy	No	No	not assessed	not assessed	No	No	No data	
Endeavour	-	-	-	not assessed	-	-	-	No data	
	Final - full coverage	Yes/provisio nal	Yes:-	not assessed	not assessed	Yes - complete coverage	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html http://www.nrw.qld.gov.au/wrp/catchments.html
Flinders River*	N/A								
Fraser Island	Statewide policy	No	No	not assessed	not assessed	No	No	No data	
Georgina-Diamantina	Final - full coverage of water management area	No	Yes:-	not assessed	not assessed	Yes - complete coverage of water managem ent area	Yes	No data	http://www.legislation.qld.gov.au/LEGISLATION/CURRENT/W/WaterReGeP04.pdf http://www.nrw.qld.gov.au/wrp/georgina_diamantina.html http://www.nrw.qld.gov.au/wrp/catchments.html
Gilbert River*	N/A								
Gold Coast	In progress	Yes/provisio nal	No	not assessed	not assessed	No	No	No data	http://www.nrw.qld.gov.au/wrp/catchments.html

Gulf	Final WRP/ROP approved	Yes/absolute	Yes	not assessed	not assessed	Yes	Yes	No data	http://www.nrw.qld.gov.au/wrp/gulf.html http://www.nrw.qld.gov.au/wrp/pdf/gulf/gulf_draft_rop_summary.pdf
Herbert	Not planned but identified as requiring a plan	No	No	not assessed	not assessed	No	-	No data	
Holroyd*	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Horne Island*	N/A								
Jacky Jacky	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Jardine*	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Johnstone	Not planned, requiring plan	No	No	not assessed	not assessed	No	-	No data	
Leichhardt River*	N/A								
Lockhart	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Logan Basin	In progress	Yes/provisional	No	not assessed	not assessed	No	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
Mary River	Draft	No	No	not assessed	not assessed	No	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
Mitchell River*	In progress	Yes/provisional	Yes:-	No	not assessed	No	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
Moonie	Final – full coverage	Yes/absolute	No	not assessed	not assessed	Yes – complete coverage	Yes	not assessed	http://www.nrw.qld.gov.au/wrp/catchments.html http://www.nrw.qld.gov.au/wrp/catchments.html
Moreton	In progress	No	No	not assessed	not assessed	No	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
Morning Inlet *	N/A								
Mornington island*	N/A								
Murray	Not planned	No	No	not assessed	not assessed	No	-	No data	

	but identified as requiring a plan								
Nebine	Final – full coverage of water management area	Yes/Absolute	No	not assessed	not assessed	Yes – complete coverage of water management area	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html http://www.nrw.qld.gov.au/wrp/catchments.html
Nicholson*	N/A								
Norman River*	N/A								
Normanby	Statewide policy	No	No	not assessed	not assessed	No	-	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
O'Connell	In progress	Yes/Provisional	No	not assessed	not assessed	No	No	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
Olive-Pascoe	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Paroo	Final – full coverage of water management area	Yes/Absolute	No	not assessed	not assessed	Yes – complete coverage of water management area	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html http://www.nrw.qld.gov.au/wrp/catchments.html
Pioneer	Final – full coverage of water management area	Yes/Absolute	Yes Licensing entitlements	not assessed	not assessed	Yes – complete coverage of water management area	Yes	No data	http://www.nrw.qld.gov.au/wrp/catchments.html http://www.nrw.qld.gov.au/wrp/catchments.html
Plane	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Proserpine	In progress	Yes/Provisional	No	not assessed	not assessed	No	No	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
Ross	Statewide policy	No	No	not assessed	not assessed	No	No	No data	
Settlement Creek*	N/A								
Shoalwater	Statewide policy	No	No	not assessed	not assessed	No	No	No data	
Southern Gulf	In progress	Yes/Provisional	No	not assessed	not assessed	No	No	No data	Integrated management plan
Staaten River*	N/A								
Stewart	Statewide	No	No	not assessed	not assessed	No	-	No data	

Styx	policy Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Thursday Island*	N/A								
Torres Strait Islands	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Tully	Not planned but identified as requiring a plan	No	No	not assessed	not assessed	No	-	No data	
Warrego	Final – full coverage of water management area	Yes/Absolute	No	not assessed	not assessed	Yes – complete coverage of water management area			http://www.nrw.qld.gov.au/wrp/catchments.html http://www.nrw.qld.gov.au/wrp/catchments.html
Waterpark	-	-	-	-	-	-	-	-	
Watson*	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Wenlock*	Statewide policy	No	No	not assessed	not assessed	No	-	No data	
Whitsunday	In progress	Yes/Provisional	No	not assessed	not assessed	No	No	No data	http://www.nrw.qld.gov.au/wrp/catchments.html
Basin	Water planning status	Water resource caps	Surface water / groundwater interaction	Surface water sustainable yield (ML)	level of entitlements relative to the sustainable yield	Environmental water requirements	Formal environmental water provisions for regulated rivers *	Level of diversions relative to the sustainable yield?	Integrated management plan/environmental flows
WESTERN AUSTRALIA									
Albany Coast	Not planned requiring plan	No	No	19000	Low development	Yes – partial coverage	-	Low level (0 – 29%)	
Ashburton River	In progress	No	No	27600	Low development	No	-	Low level (0 – 29%)	
Avon River	Not planned requiring plan	No	No	9700	Low development	No	-	Low level (0 – 29%)	
Blackwood River	In progress	No	No	112000	Low development	Yes – partial coverage	-	Low level (0 – 29%)	Completed Environmental Flows Reports
Cape Leveque Coast*	Statewide policy	No	No	1000	Low development	No	-	Low level (0 – 29%)	
Collie River	In progress	No	Yes: Separate surface water and	165000	High development	Yes - partial coverage	Yes	Moderate diversions (30 - 69%)	

			groundwater management plans allowing for short term and long term impacts						
De Grey River	In progress	No	Yes: Groundwater management plan driven by surface water flows	124000	Low level of development	No	-	Low level (0 - 29%)	
Denmark River	Not planned requiring plan	No	No	36900	Low development	No	-	Low level (0 - 29%)	
Donnelly River	Not planned requiring plan	No	No	91000	Low development	No	-	Low level (0 - 29%)	
Drysdale River*	Not planned NOT requiring a plan	No	No	166000	Low development	No	-	Low level (0 - 29%)	
Esperance Coast	Not planned NOT requiring a plan	No	No	4200	Low development	No	-	Low level (0 - 29%)	
Fitzroy River*	Not planned requiring plan	No	No	736600	Low development	No	-	Low level (0 - 29%)	
Fortescue River	In progress	No	Yes: Groundwater management plan driven by surface water flows	10000	Low development	No	-	Low level (0 - 29%)	
Frankland River	Not planned requiring plan	No	No	6000	Low development	No	-	Low level (0 - 29%)	
Gascoyne River	Not planned NOT requiring a plan	No	Yes: Groundwater management plan driven by surface water flows	196000	Low development	Yes - partial coverage of water management area	-	Low level (0 - 29%)	
Greenough River	Not planned requiring plan	No	No: There is minimal connectivity between surface water and groundwater	37900	Low development	Keep River	-	Low level (0 - 29%)	
Harvey River	Draft	No	No	149400	High development	Yes - partial coverage	Yes	Moderate diversions (30 - 69%)	Completed Environmental Flows Reports
Isdell River*	Not planned NOT requiring a plan	No	No	160800	Low development	No	-	Low level (0 - 29%)	
Keep River*	In progress	No	No	1000	Low development	No	-	Low level (0 - 29%)	
Kent River	Not planned	No	No	20000	Low development	No	-	Low level (0 - 29%)	

	requiring plan								
King Edward River*	Not planned NOT requiring a plan	No	No	176500	Low development	No	-	Low level (0 - 29%)	
Lennard River*	Not planned NOT requiring a plan	No	No	281600	Low development	No	-	Low level (0 - 29%)	
Lyndon-Minilya Rivers	Not planned NOT requiring a plan	No	No	3800	Low development	No	-	Low level (0 - 29%)	
Mackay	Other	No	No	0	Low development	No	-	Low level (0 - 29%)	
Mary River*	N/A								
Moore-Hill Rivers	Not planned requiring plan	No	No	20400	Low development	Yes - partial coverage	-	Low level (0 - 29%)	
Murchison River	Not planned NOT requiring a plan	No	No	500	Low development	No	-	Low level (0 - 29%)	
Murray River	Not planned requiring plan	No	No	133000	-	Yes - partial coverage	-	Moderate diversions (30 - 69%)	
Ninghan	Other	No	No	1000	Low development	No	-	Low level (0 - 29%)	
Nullarbor (Salt Lake)	Other	No	No	1000	Low development	No	-	Low level (0 - 29%)	
Onslow Coast	In progress	No	No	11100	Low development	No	-	Low level (0 - 29%)	
Ord River*	Draft	No	No	1294100	High development	Yes - partial coverage	Yes	Low level (0 - 29%)	Completed Environmental Flows Reports
Pentecost River*	Not planned NOT requiring a plan	No	No	196000	Low development	No	-	Low level (0 - 29%)	
Port Hedland Coast	In progress	No	Yes: Groundwater management plan driven by surface water flows	29200	High development	Yes - partial coverage	-	Moderate diversions (30 - 69%)	
Preston River	Not planned requiring plan	No	No	50000	Low development	Yes - partial coverage	-	Low level (0 - 29%)	
Prince Regent River*	Not planned NOT requiring a plan	No	No	145000	Low development	No	-	Low level (0 - 29%)	
Sandy Desert	Other	No	No	0	Low development	No	-	Low level (0 - 29%)	
Shannon River	Not planned requiring plan	No	No	58090	Low development	No	-	Low level (0 - 29%)	
Swan Coast	Not planned requiring plan	No	No	125000	Over-allocated	Yes - partial coverage	-	High diversions (70 - 100%)	

Warburton	Other	No	No	0	Low development	No	-	Low level (0 - 29%)	
Warren River	Not planned requiring plan	No	No	207000	Low development	No	-	Low level (0 - 29%)	

- Please note that a dash means that either the data was not available, not provided or that the question was not relevant for a particular area

