Section 71, Cap and Matter 9.1 & 9.2 Reporting for 2016-17

Water resource management overview for the State

Legislative changes

Changes to a number of provisions in the Queensland *Water Act 2000* started on 6 December 2016. These changes provide for a new water planning framework that recognises that future planning processes will be about refining existing plans, not about starting new planning processes. The new framework provides a clear separation between strategic elements (previously in a water resource plan) and operational elements (previously in a resource operations plan), with greater flexibility to amend operational documents whilst ensuring that strategic water plans continue to be based on robust science and stakeholder consultation.

Queensland's water resource plans are being replaced with water plans which now have some additional functions, such as specifying water management areas and trading zones. The water plan is subordinate legislation prepared by the Minister for Natural Resources and Mines and approved by Governor-in-Council.

Resource operation plans are being separated into:

- Water management protocols – which include the water sharing rules and temporary trade rules for unsupplemented (run of the river) water, and the water access entitlement change rules for supplemented (supplied by an irrigation infrastructure operator) and unsupplemented water.
    - Water management protocols are able to be amended by the chief executive of the Department of Natural Resources and Mines (the department), provided that the amendment is consistent with the water plan.
- Resource operations licences and distribution operations licences – which detail the roles and responsibilities of irrigation infrastructure operators to achieve the outcomes of the associated water plan.
    - These licences are granted and amended by the chief executive of the department through an application process set out in the Water Act.
- Operations manuals – which include the day to day operation rules for the associated water supply scheme.
    - Operations manuals are prepared by the resource and distribution operations licence holders and must be approved by the chief executive of the department.

Surface water

Surface water in the Queensland section of the Murray-Darling Basin (QMDB) is divided into four separate SDL resource units: Warrego-Paroo-Nebine, Condamine-Balonne, Moonie, and Queensland Border Rivers water resource plan areas. The Basin Plan requires local reductions in the Queensland Border Rivers and the Condamine-Balonne water resource plan areas, with a gap of 8 GL and 100 GL, respectively, identified in the Plan. The Commonwealth's Water for the Future initiatives of Healthy Headwaters (to provide infrastructure related investment) and buyback continue to target water in these catchments,

with the in-catchment reduction met in the Queensland Border Rivers and nearly 60% of the in-catchment reduction bridged in the Condamine-Balonne.

Queensland has transitional water resource plans in place for the management of overland flows and water in watercourses, lakes and springs within all catchments in the QMDB. These water resource plans are taken to have been accredited under the Commonwealth Water Act and are to be replaced by 2019.

The Warrego-Paroo-Nebine Water Resource Plan was accredited in June 2017. Following the release on 6 July 2017 of the Statements of Proposals, Queensland is currently reviewing the transitional water resource plans for the Condamine and Balonne, Border Rivers and Moonie catchments under the *Water Act 2000* in consultation with regional stakeholders.

Groundwater

In the QMDB, groundwater managed under the Basin Plan includes water in all formations above (and one formation below) the Great Artesian Basin (GAB). Water in aquifers in the GAB is managed under the *Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017*. Amendments have been made to transitional water resource plans to include the aquifers under the Condamine and Balonne, Border Rivers and Moonie catchments to continue to limit further development ahead of second generation plans. The development of the second generation state-based water plans and compliance with the Basin Plan involves a suite of consultation and planning and policy work looking at groundwater matters such as water licence conversions, water trading frameworks and water management arrangements.

Management of groundwater under the Basin Plan is now divided into 15 resource units based on groundwater aquifers that underlie various surface water catchments. These units more comprehensively cover the QMDB area than those reported on prior to 2012, consequently there has been an increase in the aquifers reported on since 2011/12.

The current focus for Queensland's groundwater systems in the MDB is to meet the Basin Plan SDL in 2019. There are two key groundwater systems (Central Condamine Alluvium and the Condamine Tributary Alluviums) where the SDL is below the BDL, requiring water to be recovered through buyback of entitlements. There were two tender rounds announced in the 2015/16 water year for buyback of entitlement in the Central Condamine Alluvium and the Condamine Tributary Alluviums. While there were no tender rounds announced in the 2016/17 water year, a small number of entitlements purchased by the Commonwealth Environmental Water Holder (CEWH) were settled in this year.

To ensure ongoing sustainable management of the groundwater systems in line with the Basin Plan, various other management tools have been implemented. These include the amendment of water sharing rules in relevant groundwater management areas to authorise relocation (permanent trading) of water licences and to facilitate water recovery by the Commonwealth as well as the creation of a Water Management Plan for the Central Condamine Alluvium, which is considered to be an Interim Water Resource Plan under the Commonwealth Water Act. Additionally the Condamine and Balonne, Border Rivers and Moonie water resource plans were amended in December 2014 to include arrangements for the management of the other Basin Plan aquifers. This provides transitionary management

arrangements prior to finalisation, and accreditation under the Basin Plan, of the water plans for the Border Rivers, Moonie and Condamine and Balonne catchments, which are currently under development.

The take of water from an aquifer for stock and domestic purposes by the owner of the land overlying the aquifer is managed under the *Water Act 2000*. Access for these purposes has previously been limited under the Act (by moratorium) in the Upper Condamine Basalts and the Upper Condamine Alluvium (both Central Condamine and Tributaries) to restrict growth of groundwater use in the expanding peri-urban areas. These provisions have transitioned into the amended water plans for the Condamine and Balonne, Border Rivers and Moonie catchments. The current restrictions help ensure a 'no-growth' position in the higher risk area of peri-urban expansion. In short, the limitation restricts stock and domestic take to those who either have existing bores or who are located outside town water reticulation areas. Within town water areas, no new take of groundwater for stock and domestic purposes is permitted.

Cap compliance

Diversions from watercourses and floodplain harvesting reached 86% of the Cap target for the Condamine and Balonne catchment, 86% for the Border Rivers catchment, 41% for the Moonie, 14% for the Warrego, 0% for the Paroo and 0% for the Nebine catchment for the 2016/17 water year.

Transition period section 71 reporting

This section presents a summary of the key section 71 clauses of the *Water Act 2007* for surface water resource plan areas (and SDL resource units where appropriate):

- Available water *(the quantity of water available from the water resources of the water resource plan area during that water accounting period)*

  Whilst flows across the Queensland sections of the Murray-Darling catchments were an improvement on the very low 2015/16 totals, with only a couple of exceptions they were still below the long-term average and in some cases well below that figure.

  Rains in late winter and early spring (July to September) resulted in flows across all catchments and the remnants of Tropical Cyclone Debbie generated moderate to minor flows in streams as far west as the Balonne River in early April. Rainfall totals from this weather system varied from around 100 mm or better on the eastern downs to nothing at Charleville. Useful falls of 50 to 80 mm were recorded at gauging stations in the St George and Roma areas.

  The runoff from these two events constituted all of, or the majority of, flow totals recorded at the gauging stations across the region.

River and gauging station location	Average annual flow (GL)[1]	Total volume 2016-2017 (GL)	Percentage of average
Condamine and Balonne catchment			
Condamine River @ Chinchilla	557	111	20
Condamine River @ Cotswold	715	316	44
Balonne River @ Weribone	1223	578	47
Maranoa River @ Cashmere	164	63	38
Balonne River @ St George	1185	421	35
Border Rivers catchment			
Macintyre River @ Goondiwindi	978	1624	166
Weir River @ Talwood	150	99	66
Barwon River @ Mungindi	597	398	67
Moonie catchment			
Moonie River @ Fenton	158	102	65
Warrego catchment			
Warrego River @ Cunnamulla	470	345	74
Paroo catchment			
Paroo River @ Caiwarro	518	167	32
Nebine catchment			
Nebine Creek @ Roseleigh Crossing	23	9	42

In the Condamine catchment at Warwick, there were the minor to moderate flows of the late winter/early spring and then a moderate event in late March from ex-cyclone Debbie. The summer period was significant in that the stream remained at virtually base flow for the entire period demonstrating the lack of any moderate or significant rainfall during this period. The August/September flows filled the Chinchilla Weir but did not traverse any significant distance downstream. The moderate event in early April from ex-cyclone Debbie was the only natural runoff at this gauging station during the year. Consequently, the total annual volume of 110 GL was only about 20% of the long-term average.

Water held in dams at the start of the water year in the upper and middle Condamine catchment varied from 14% of capacity in Leslie Dam to 30% in Chinchilla Weir. Both Leslie Dam and Chinchilla Weir benefited from inflows in August/September; however, supply of water to water users meant the dams finished the year at 18% and 88% capacity, respectively. The inputs to Chinchilla Weir in 2016/17 included 8.4 GL of treated coal seam gas (CSG) water discharged into the weir under an approval of a

[1] Average annual flow is the average for the period of record for that gauging station. It varies from 10 years of record at Roseleigh Crossing to 75 years at Goondiwindi. The numbers are indicative only.

resource for beneficial use. As per licence requirements, the entire volume of treated CSG water was taken within the limits of the Chinchilla Weir Water Supply Scheme. The diversion of treated CSG water is not accounted for under section 71 as this water is sourced from the Great Artesian Basin, not from water resources of the Murray-Darling Basin.

The runoff pattern was similar in the Balonne catchment with total volumes of 316 GL and 578 GL at Cotswold and Weribone, respectively, being a little under half the long-term average for each site. The total volume passing St George was 421 GL (35% of long-term average). As the flows passing St George were of only a minor to moderate nature, the volumes that reached gauging stations in the lower Balonne distributary were well below the long-term averages. Volumes with respect to average annual flows at gauging stations ranged from 25% at the Narran River to only 0.5% at Briarie Creek.

Inflow to Beardmore Dam via the Maranoa River at Cashmere was about 40% of average at 63 GL. All of this flow occurred as a result of the August/September rains with the Maranoa receding to dry for the remainder of the year. Beardmore Dam started the year at 69% capacity, filled from the September flows in the Maranoa and Condamine rivers (which also triggered water harvesting in the Lower Balonne) then declined to around 10% capacity in February. The dam benefitted from inflows from the Condamine River in March/April 2017, which enabled the dam to refill and triggered water harvesting in the Lower Balonne. Beardmore Dam finished the year at 86% capacity.

With a runoff volume of 1,624 GL, the Macintyre River at Goondiwindi was well over the annual average of around 1,000 GL. The August/September rains plus general rain in northern NSW in March and the runoff from ex-cyclone Debbie all contributed to the year's total. Opportunities for water harvesting occurred from July to October 2016 and in January and March 2017.

Glenlyon Dam in the Border Rivers catchment started the water year at 26% capacity, with inflows in August/September 2016 bringing the dam to 70% capacity. The dam decreased to 62% capacity in early March but inflows later in the month allowed it to finish the year at 75% capacity. Coolmunda Dam on the Macintyre Brook started the water year at 31% capacity, filled during the August/September flows, declined to 70% capacity in March, then re-filled in April 2017, finishing the year at 96% capacity.

The Moonie River at Nindigully was one site that showed slightly more runoff than the long-term average. The late winter/early spring rain and then a few minor events in February/March as well as the runoff from ex-cyclone Debbie were the catalysts for the recorded volume. With the absence of any significant inflow downstream of Nindigully and extractions and natural stream losses, recorded volume at Fenton was about 65% of the average.

In the Warrego catchment, minor flows were recorded at Cunnamulla in July and August 2016 with a more significant event in late September/early October. This was the last event for the water year with the stream receding to no flow by late November. Runoff of 345 GL was 74% of long-term average.

More than 60% of the total flow in the Paroo catchment emanated from the moderate flow events in September. A few minor flows through the summer months made up the balance of the year's total flow. Paroo River at Caiwarro recorded 167 GL, which is about a third of its annual average.

Flows at the Nebine and Wallam Creek stations were 42% and 25% of average respectively, although periods of record at these sites are 10 and 19 years only.

- Permitted take *(the quantity of water permitted to be taken from the water resources of the water resource plan area during the water accounting period)*

The take of water from watercourses under an entitlement[2] and by floodplain harvesting

Take of water from watercourses is managed through limits stated on entitlements and by water sharing rules in resource operations plans (which implement the provisions of Queensland's water plans). The take of overland flow water (including floodplain harvesting) is managed through a combination of regulation of works and limits on entitlements.

Annual permitted take from watercourses under an entitlement, including permitted take under entitlements held by the CEWH, is determined using a hydrologic model. The permitted take by the CEWH is then subtracted from the total. Annual permitted take by floodplain harvesting is not able to be modelled with any confidence and so is based on estimated take supported by storage measurement in the Lower Balonne.

Flow event management rules for managing medium flows (under section 279 of the Condamine and Balonne Resource Operations Plan) were activated in the Lower Balonne in September 2016, as it had been more than two years since a flow event with a peak flow of greater than or equal to 60,000 megalitres per day at Jack Taylor Weir. Narran Lakes filling flow event management rules (under section 281 of the Condamine and Balonne Resource Operations Plan) were activated in April 2017, as a flow event sufficient to fill the Narran Lakes Ramsar site under the pre-development flow pattern occurred during the period 1 April to 31 August. Accordingly, the rate of take under unsupplemented water access entitlements was reduced to 90% of the maximum permitted take for a total of 5 days over the flow event in September 2016 and 10 days in April 2017. The annual permitted take has been reduced accordingly. The flow event management rules for managing low flows under section 277 of the Condamine and Balonne Resource Operations Plan did not apply as it was less than 12 months since the previous flow through event finished.

The take of water from watercourses under basic rights

The take of water from a watercourse, lake or spring for basic rights (stock and domestic purposes) by the owner of the land adjoining the water source is permitted under the *Water Act 2000*. Potential increase in take is limited due to the right to take water being limited to properties with riparian access to water. The annual permitted take of water from a watercourse for basic rights is not currently estimated, except in the Warrego,

[2] Entitlement is used in this document as a generic term referring to water access entitlements (called water allocations in Queensland) and water licences (authorities to take water which are attached to land).

Paroo and Nebine catchments, where take is estimated using the method outlined in the Water Accounting Methods Report for the Warrego-Paroo-Nebine Water Resource Plan.

The take of water by runoff dams (including take under basic rights)

The take of overland flow water for basic rights by an owner of the land on which the water collects is permitted (within limits) under the Queensland regulatory framework. Any increase in take for basic rights will be related to rural population growth and/or an increase in stock numbers.

Under water plan provisions, no increase in overland flow take is permitted for uses other than basic rights, except for certain limited cases, such as when capture of overland flow water is necessary to satisfy the requirements of an environmental authority.

The annual permitted take of water by runoff dams is currently considered to be the long-term annual average limit estimated by the Authority and which is listed in the Plan, except in the Warrego, Paroo and Nebine catchments, where take is estimated using the method outlined in the Water Accounting Methods Report for the Warrego-Paroo-Nebine Water Resource Plan.

The take of water by commercial plantations

In Queensland, the take of water by commercial plantations is not regulated under any legislation. There are few commercial plantations in the QMDB.

The annual permitted take of water by commercial plantations is currently considered to be the long-term annual average net take estimated by the Authority and which is listed in the Plan.

- Water allocations *(details of the water allocations made in relation to the water resources of that area in relation to that water accounting period)*

Under the Commonwealth Water Act and for the purposes of the Basin Plan, water allocation[3] means the specific volume of water allocated to water access entitlements in a given water accounting period.

In Queensland, water allocations apply only to supplemented water (water provided through water supply schemes) managed under a mixture of *announced allocation* and *continuous sharing*.

Announced allocations

Water access entitlements in the Upper Condamine and Chinchilla Weir water supply schemes in the Condamine-Balonne water resource plan area are managed under an annual announced allocation system. At the start of the water year, water in the scheme's storage/s is first set aside for 24 months' supply for high priority users (mainly

[3] In Queensland, a *water allocation* refers to a water access entitlement (which is defined by the Commonwealth Water Act as 'a perpetual or ongoing entitlement, by or under a law of a State, to exclusive access to a share of the water resources of a water resource plan area'). Basin Plan terminology is used in this report.

town water supply and associated water losses during storage and distribution). The medium priority entitlement holders are then granted the remaining water as a percentage of their water access entitlement, taking into account losses associated with storage and distribution for the remainder of the water year.

The announced allocation is recalculated each month but only reset if the announced allocation would increase by 5 or more percentage points or would increase to 100% (due to more water becoming available through inflows into the scheme). The usage in a water year may be no greater than 100% of the entitlement.

There is no high priority water in the Cunnamulla Water Supply Scheme in the Warrego catchment. Otherwise, announced allocations are made in a similar way to those in the Upper Condamine and Chinchilla Weir water supply schemes.

Continuous share schemes

The St George Water Supply Scheme in the Condamine-Balonne water resource plan area and the Macintyre Brook Water Supply Scheme in the Queensland Border Rivers water resource plan area provide management options which include both announced allocation and continuous share. Most of the entitlements in the scheme are managed under continuous share arrangements. All medium priority entitlements in the Border Rivers Water Supply Scheme are managed under continuous sharing rules.

In a continuous accounting system, water users have storage accounts, which are proportional to their share of the total entitlement in the scheme. The storage account increases when distributions are made (i.e. there is inflow into the water storage) and decreases with water use, evaporation and seepage losses.

In any water year, the volume available under an entitlement managed as an individual continuous share is the volume in the storage account at the start of the water year plus any water distributed to the account under the rules in the relevant resource operations plan following an inflow into the scheme, capped at 100% of the nominal volume of the water access entitlement (plus any carry over or forward draw made available in the St George Water Supply Scheme).

The announced allocation for water supply schemes in the QMDB in 2016/17 is shown in the table below. In the continuous share schemes, the announced allocation shown in the table applies to water allocations managed as part of the bulk share.

Water supply scheme	Announced Allocation – high priority (%)	Announced Allocation – medium priority (%)	Comments
Condamine and Balonne catchment			
Upper Condamine	100	84	
Chinchilla Weir	100	100	
Maranoa River	N/A	N/A	Announced allocations do not apply to this scheme.
St George	N/A	95	Announced allocations only apply to entitlements managed as part of the bulk share.
Border Rivers catchment			
Border Rivers	N/A	N/A	
Macintyre Brook	100	100	Announced allocations only apply to entitlements managed as part of the bulk share.
Cunnamulla	N/A	100	

- Actual take (*the quantity of water actually taken from the water resources of the water resource plan area during the water accounting period)*

The take of water from watercourses under an entitlement and by floodplain harvesting

Diversion in the QMDB is generally characterised by much greater volumes of unsupplemented water compared to supplemented water. The take of supplemented water in 2016/17 was 13% of the total take, take of unsupplemented water was 65% and overland flow (floodplain harvesting) 22%.

The works of the major water users in the QMDB have been metered to improve reliability in monitoring use. The installation of instruments to measure offstream storage levels in the Lower Balonne was completed in the 2012/13 water year. Combined with measurement of direct take from the watercourse, this informs estimates of floodplain harvesting take in the area. A combination of estimates and measurement of water use are provided for all watercourse take and significant areas of floodplain harvesting.

The take of water from watercourses under basic rights

Water taken from watercourses under basic rights is not measured and is currently not included in annual estimates of take, except in the Warrego, Paroo and Nebine catchments, where take is estimated using the method outlined in the Water Accounting Methods Report for the Warrego-Paroo-Nebine Water Resource Plan.

The take of water by runoff dams (including take under basic rights)

Water taken by runoff dams is not measured and is currently considered to be the long-term annual average limit estimated by the Authority and which is listed in the Plan.

The take of water by commercial plantations

The annual actual take of water by commercial plantations is currently considered to be the long-term annual average net take estimated by the Authority and which is listed in the Plan.

There are no commercial plantations in the Moonie, Warrego, Paroo and Nebine catchments.

Summary of surface water take

Diversions from a watercourse and by floodplain harvesting reached 562 GL (86% of the water permitted to be taken) for the Condamine and Balonne catchment, 520 GL (86%) for the Border Rivers catchment, 26 GL (41%) for the Moonie, 7 GL (14%) for the Warrego, 0 GL (0%) for the Paroo and 0 GL (0%) for the Nebine catchment for the 2016/17 water year.

- Decisions affecting permitted take *(details of any other decisions made by, or under the law of, the Basin State, that permit the taking of water from the water resources of that area during that water accounting period)*

Less than 13 ML was made available in the QMDB for short-term use under water permits.

- Trade details *(details of the trading or transfer of tradeable water rights in relation to the water resources of that area during that water accounting period: within the area; and into the area; and from the area)*

Temporary and permanent trading of unsupplemented water access entitlements within a water management area and of supplemented water access entitlements within a water supply scheme (subject to specific rules in the water plan and resource operations plan) may occur in all water resource plan areas in the QMDB. Resource operations plans prohibit some trades where it has already been assessed that trade cannot occur without impacts.

Out of 61 GL of water permanently traded in the QMDB in 2016/17, 50 GL was traded separately from land and 11 GL traded with land, with the largest percentage of the total volume of permanent trades occurring in the Condamine-Balonne water resource plan area.

The New South Wales – Queensland Border Rivers Intergovernmental Agreement 2008 (the IGA) provides for permanent and temporary interstate trade of supplemented and unsupplemented water. This applies to water access entitlements in the Border Rivers water supply schemes and the Border Rivers Water Management Area. Take of water through works that are permanently linked to an entitlement for supplemented or unsupplemented water in the other state is not reported as trade for section 71 purposes.

Under the IGA, the State of origin accounts for water taken under an entitlement granted by the State of origin. Therefore, water temporarily traded from Queensland to New South Wales is accounted for as actual and permitted take under Queensland water access entitlements in accordance with the IGA. Likewise, water traded from New South Wales to Queensland is not accounted for as actual take by Queensland. Consequently, there is no requirement for Queensland to adjust permitted take to account for interstate trade.

In the Border Rivers catchment in 2016/17, 10 GL of New South Wales supplemented water was authorised for use in Queensland and 60 GL of Queensland unsupplemented water was authorised for use in New South Wales.

There was no temporary trade between consumptive and environmental entitlement pools in 2016/17 and no environmental entitlements were traded back for consumptive use.

Groundwater

This section presents a summary of the key section 71 clauses of the *Water Act 2007* for groundwater resource plan areas (and SDL resource units where appropriate).

- Available water *(the quantity of water available from the water resources of the water resource plan area during that water accounting period).*

For reporting purposes there is not considered to be any change to the available water overall (the available water being based on the long term average recharge as per the RRAM report).

- Permitted take (*the quantity of water permitted to be taken from the water resources of the water resource plan area during the water accounting period).*

The take of water from aquifers under an entitlement

Entitlements to take water from aquifers in the QMDB are in the form of water licences (or water permits) and these include conditions that identify the nominal entitlement (volumetric limit) and the particular aquifer (source).

The take of water from aquifers under basic rights

Permitted take for basic rights is authorised under the *Water Act 2000* and does not require a water entitlement in the aquifers managed under the Basin Plan.

- Decisions affecting permitted take *(details of any other decisions made by, or under the law of, the Basin State, that permit the taking of water from the water resources of that area during that water accounting period).*

There were some minor changes to permitted take for individual aquifer units that resulted primarily from processes to more accurately identify the appropriate aquifer unit being accessed. This effectively resulted in a slight redistribution of entitlement across some aquifers. There were no other decisions affecting permitted take.

- Water allocations *(details of the water allocations made in relation to the water resources of that area in relation to that water accounting period).*

Access to the nominal entitlement (permitted take) for any entitlement holder can be limited when the groundwater systems are under stress or decline, either over the longer-term (e.g. the Central Condamine Alluvium) or seasonally (e.g. tributary catchments). There were no reductions to the levels of access for entitlement holders from the previous (2015/16) year although messaging was provided around the need for recharge to prevent a reduction in access in the future. While the majority of aquifers and management areas were able to take 100% of their nominal entitlements, the more closely managed Central Condamine Alluvium Groundwater Management Area (GMA) is an exception, with the licensees in this area either limited to 50% or 70% depending on their location within the system. The Central Condamine Alluvium limitations have remained consistently at this level since 2011 while the access in other aquifers has risen and fallen over time as a result of changes in seasonal conditions.

- Actual take *(the quantity of water actually taken from the water resources of the water resource plan area during the water accounting period)*

The take of water from aquifers under an entitlement

In many highly developed groundwater systems, the works of entitlement holders have been metered to improve the reliability in monitoring use. In those systems that are unmetered, the nominal entitlement, adjusted for any limitations, is considered to represent the actual use. Estimated data are combined with the metered data to provide a picture of the total water use.

The diversion of water taken under licensed entitlements for 2016/17 is 158 GL from a combination of metered and estimated use. This does not include take under basic rights.

The take of water from aquifers under basic rights

Queensland does not require works (infrastructure that includes bores, wells, spears and excavations) that take water for the purpose of basic rights to be metered. Accordingly, use volumes have been estimated. Currently the estimated volume of take reported is the volume used by the MDBA in the determination of the SDL; however, for accredited plans the permitted take for basic rights will be estimated using the method outlined in the Queensland Murray Darling Basin Methodology for Estimating the Take of Groundwater for Stock and Domestic Purposes (Parsons Brinckerhoff, 2011).

A total of nearly 32.5 GL is estimated to have been taken across the aquifers in the Border Rivers, Moonie and Condamine and Balonne plan areas using the methodology available at the time of the release of the Basin Plan (including a separation of the Qld Border Rivers Fractured Rock aquifer value). A total of just over 1 GL is estimated to have been taken in the WPBN plan area for stock and domestic purposes, based on the accredited methodology, as outlined in the Parsons Brinckerhoff report referenced above.

- Trade details *(details of the trading or transfer of tradeable water rights in relation to the water resources of that area during that water accounting period: within the area; and into the area; and from the area).*

Permanent trading (relocation) of water licences is permitted throughout the Upper Condamine Alluvium (Central Condamine Alluvium) area as well as in the Oakey and Dalrymple Creek Alluvium areas within the Upper Condamine Alluvium (Tributaries). Temporary trading (seasonal assignment) is also available across these areas as well as in parts of the Upper Condamine Basalts (Toowoomba City Basalts, Upper Hodgson Creek Basalts) and in part of the Queensland Border Rivers Alluvium (Border Rivers Alluvium) area. These water sharing rules allow for greater water entitlement flexibility for licensees and enables the buyback of entitlements by the Federal Government to continue in these areas. A small number of entitlements were traded during the year with just over 1.2 GL of permanent trade and nearly 4.7GL of temporary trade across the QMDB area.

Summary of groundwater take

Rainfall this year has again tended towards being drier than average. It was a wetter than average start to the year with above average rainfall through winter and into spring leading to widespread summer crop planting. Rainfall through late spring and summer was well below average and combined with the large crop area resulted in an increase in water use from groundwater sources. Ironically a very wet March (from the influence of Cyclone Debbie) greatly affected harvesting of summer crops. The year finished with below average rainfall through the end of autumn and into winter. Overall, the groundwater systems with a high degree of connectivity to surface water are continuing to show signs indicative of a reduction in benefit from recharge (due to limited localised rainfall and flow events), especially the basalt and alluvial systems along the Great Dividing Range. While a rapid rise in water levels occurred in many of these groundwater systems after the exceptionally wet 2010/11 water year, the levels have been steadily falling since then and in some areas are starting to approach the record lows reached in the millennial drought period.

Total diversion of groundwater in the QMDB in 2016/17 for all resource units was higher than last year. Diversions for all aquifer units were within the respective SDLs except for the Central Condamine Alluvium (GS64a) which was measured at 105% of SDL but still well below BDL. Compliance with Basin Plan SDLs will be required from 2019. Use in the Central Condamine Alluvium has been reduced by limiting take for most entitlements to 50% and 70%. Diversions in this system should move into alignment with the SDL as buyback progresses. For Queensland's other three most developed systems, diversions in the Upper Condamine Alluvium (Tributaries) and Queensland Border Rivers Alluvium were around 80% and in the Upper Condamine Basalts around 90% of the respective SDLs.

2016/17 Snapshot of Water Diversions in the QMDB

Resource	Diversion 2016/17 (GL)	Permitted take 2016/17 (GL)	Diversion 2015/16 (GL)
Surface water (take from a watercourse and by floodplain harvesting)	1115	1379	360
Groundwater	192	262	187

Environmental water – held and planned

In Queensland, water planning incorporates provisions for balancing the often competing interests in water between human consumptive needs and the environment. Environmental water requirements are primarily met through the various water sharing rules specified in the water plans. In addition, there is held environmental water consisting of water access entitlements gifted by the Queensland Government to the Commonwealth and water which has been recovered by the Commonwealth from entitlement holders through the Water for the Future programs of buyback and investment in on-farm water use efficiency works.

Water gifted to the Commonwealth has been provided from unallocated water set aside in the Warrego, Nebine, Moonie and Border Rivers catchments. This previously unallocated water has never been included in the Cap target. Water recovered by the Commonwealth from entitlement holders has previously been included in the Cap target as irrigation water and the Cap target is reduced by the modelled volume of held environmental water entitled to be taken.

Information about the volume of held environmental water and its use can be found at http://www.environment.gov.au/water/cewo/catchment.

For the purposes of reporting under Matter 9.2 (volume of planned environmental water), Queensland has reported the volume of water provided for environmental purposes under specific flow event management rules in the relevant resource operations plans. These rules include: flow event management arrangements and preservation of tributary inflows in the Border Rivers; low, medium and Narran Lakes flow event management arrangements in the Lower Balonne; and flow event management arrangements in the Warrego. In 2016/17 these rules provided in-stream benefits in the Lower Balonne distributaries and Border Rivers.

No trading of environmental water occurred in the year. The Commonwealth Environmental Water Office is continuing to evaluate event based mechanisms for achieving better environmental watering outcomes in the Lower Balonne.

Progress of water reform

Surface water

There are categories of take defined in the BDL for which Queensland is not able to provide estimates of the take of water with any confidence due to lack of data. These include:

- Take from watercourses under basic rights;

- Take from runoff dams;
- Take by commercial plantations.

Methods for determining permitted and actual take have already been developed for the Warrego-Paroo-Nebine Water Resource Plan and are in the process of being developed as part of water resource plan accreditation for the remaining QMDB catchments. However, management and monitoring of related infrastructure is recommended as an alternative approach to estimating take. Infrastructure based management strategies are already in place to limit the take of water in those categories where there is a high risk of growth in take compromising diversion limits. For example, water plans limit the purposes for which a new runoff dam can be constructed and the construction of new stock and domestic bores in areas serviced by town water supply in the Upper Condamine. Infrastructure growth in other areas of take will be monitored over time and management strategies reviewed in regards to changes in the risk to the resource.

Risk assessment processes for the Condamine-Balonne, Border Rivers and Moonie water resource plan areas have been carried out to inform the review and development of the next generation water plans.

Groundwater

All groundwater systems will be fully incorporated into Queensland's water plans prior to the implementation of the Basin Plan in 2019. The planning process to include the aquifers under the Warrego, Paroo, Bulloo and Nebine area in the second generation water planning process has been finalised and this Water Plan has been accredited under Basin Plan provisions.

The MDBA, in conjunction with Queensland, have been engaged in several projects to gain a better understanding of various aspects of groundwater systems in the QMDB. The projects have primarily focussed on the more heavily utilised and lesser known groundwater systems to improve collective knowledge and assist in future management directions. Three of the projects have involved the Upper Condamine Alluvium and Upper Condamine Basalts.

Upper Condamine Alluvium modelling

Improved modelling of the Central Condamine Alluvium (CCA) will help to inform the longer term sustainable capacity of the system and look at potential changes in the system as buyback recovers entitlements. The Upper Condamine Alluvium project is ongoing and nearing completion with the incorporation of the tributary alluvial systems into the CCA model currently being undertaken. The first three stages have been completed, with stage 3 being completed December 2015, and stage 4 well advanced. The tributary systems are hydraulically linked to the CCA and as such, impact on how the CCA operates longer-term.

Office of Groundwater Impact Assessment (OGIA) interconnectivity project

OGIA engaged the Queensland University of Technology to undertake research on connectivity within and between groundwater and surface water systems in the Upper Condamine Tributaries. This project was recently finalised.

Upper Condamine Alluvium (UCA) (Tributaries) – Hydrogeological and hydrochemical characterisation of recharge and connectivity

This work is investigating geochemical and thermal signatures of various water sources to assist in determination of the degrees of connectivity (if any), which will improve knowledge and better inform future management and trade arrangements.