

Explanatory report on unsupplemented flow management rules changes in the Lower Balonne 2019

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This publication has been compiled by <insert name/s> of <insert business group>, <insert department>.

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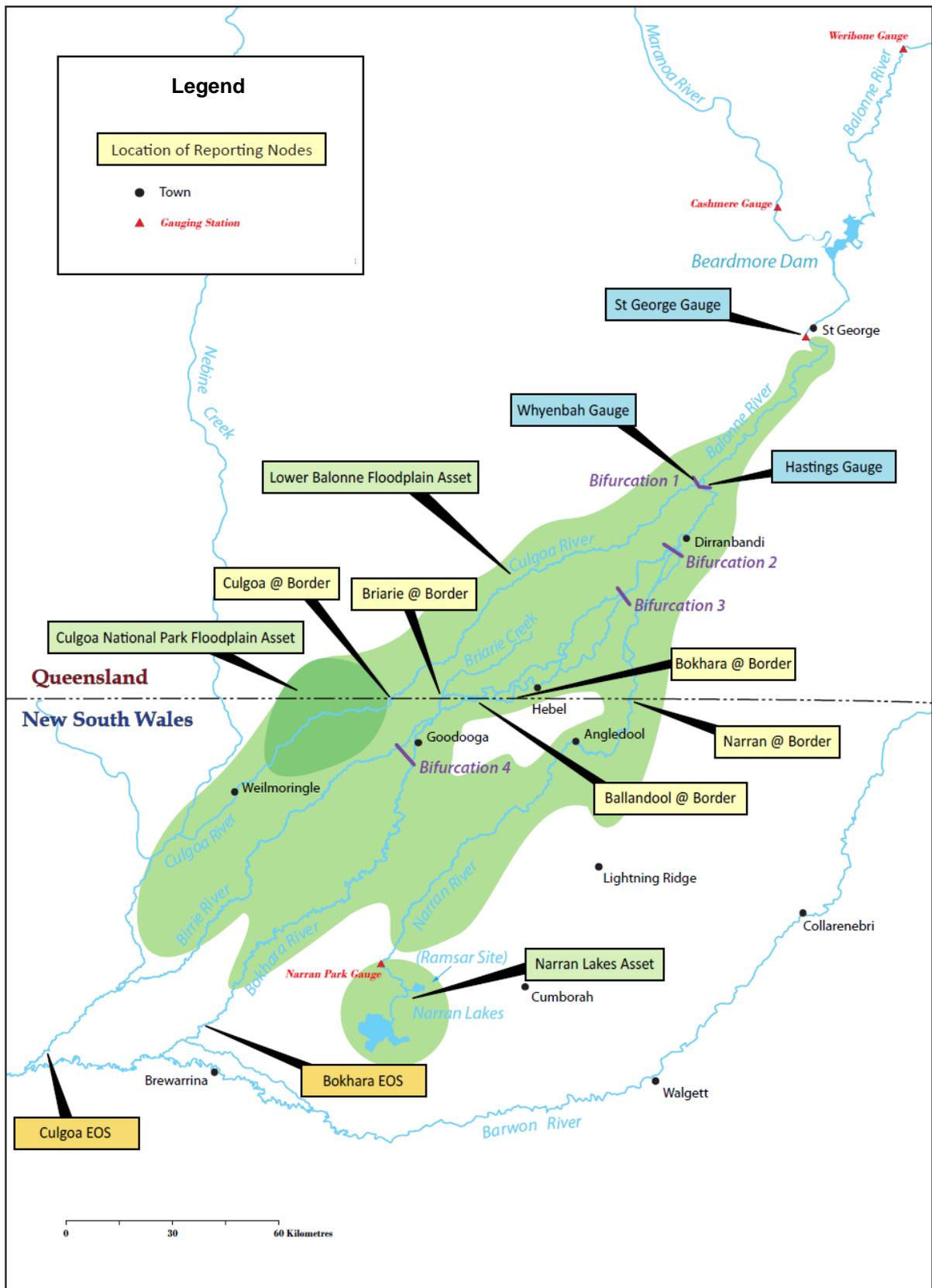
Introduction

Queensland's water planning framework, established under Queensland's *Water Act 2000* and the *Environmental Protection Act 1994*, takes a rules based approach to managing water. The key statutory water plans under these acts provide for the sustainable allocation and management of Queensland's water resources through specifying arrangements to achieve economic, social, cultural and environmental outcomes in a water plan area. These arrangements include rules and strategies for meeting environmental outcomes, which are subject to review prior to a water plan's expiry.

The Water Plan (Condamine and Balonne) 2003 (2003 water plan), scheduled to expire in 2019, was reviewed in 2017–18 to identify the effectiveness of current rules. This process identified a number of rules which could be improved, including an amendment of current environmental flow rules for the Lower Balonne.

This report sets out the method and information used to develop revised environmental flow rules to Narran Lakes, a Ramsar-listed wetland in the Lower Balonne floodplain. On release of the draft water plan on 11 April 2018, these rules were subject to public consultation and comment and, since then, have been incorporated into the final Water Plan (Condamine and Balonne) 2019 (2019 water plan).

Figure 1. Map of rivers in the Lower Balonne



Background

The Condamine–Balonne plan area is located in the south-west Queensland in the northern part of the Murray–Darling Basin (MDB). The plan area is located within a semi-arid zone, where droughts and floods are characteristic. Land use is dominated by grazing on dryland pasture, with the remainder being for conservation, small-scale irrigation and small urban centres. The catchment's extensive floodplains provide habitat for a diverse range of plants and endangered plant communities. The water in the plan area also provides for the health and maintenance of important ecological features, including the Culgoa floodplains and the Ramsar listed Narran Lakes Nature Reserve. Figure 1 shows the location of Narran Lakes in the Lower Balonne.

The 2003 water plan includes provisions to manage low, medium and Narran-filling flows to enhance environmental outcomes (summarised in Table 1). Each provision is activated by an environmental trigger, resulting in a required action to reduce water harvesting take.

Table 1: Current flow event management rules for water harvesting entitlements (2003 water plan)

Rule	Trigger	Action
Low	More than 12 months since a flow through event	Water harvesting reduced by 10% for up to 5 days ¹
Medium	More than 2 years since a flow peak of 60,000ML per day at Jack Taylor Weir, or More than 3 years since a flow peak of 100,000ML per day at Jack Taylor Weir	
Managing Narran lakes filling flows	Filling: Flow sufficient to fill Narran Lakes Ramsar site under pre-development flow conditions between 1 April and 31 August	Water harvesting reduced by 10% for up to 10 days
Narran top-up	Refilling: Flow sufficient to re-fill Narran Lakes Ramsar site under pre-development within 4 months of a Narran filling flow	

The Narran filling and Narran top-up flows are intended to improve water availability for bird breeding at the Narran Lakes Ramsar site. The triggers for the rules are linked to flow events of sufficient volume to either fill or refill the Ramsar site under pre-development flow patterns conditions. This means that the only way to assess if a flow entering the Lower Balonne would trigger an action under this rules with any degree of confidence is through the use of a hydrologic model that replicates pre-development conditions (i.e. no irrigator diversions and no dams). The use of the hydrologic model is required because the size and duration of flows vary from one flow to the next, and because of the complex braided system of watercourses in the Lower Balonne floodplain (Lower Balonne Distributary System).

Narran Lakes may be filled by either a relatively small flow event that has a long duration or a medium to large flow event. In addition, flow events which trigger the Narran rules occur unpredictably. Modelling support may be required outside of normal work hours, when it is unavailable, meaning that the decision to trigger the rule is delayed.

The 2003 Narran rules, based on real time hydrological modelling, have been difficult to implement in practice. A simpler method, which could be implemented by the operator in real-time was needed in order to ensure that the rules were providing the level of environmental protection that was intended.

¹ For all rules, if the announced access period is less than 5 days, the rule applies for the duration of the announced access period.

Methods applied for rule development

Principles

The development of a new Narran rule had to address three key principles:

- Maintain the volume and effectiveness of planned environmental water (Basin Plan requirement 10.28)
- Maintain the volume of diversions available to water users
- Be easy to implement in real time during an event

Identifying a new Narran rule

To understand the utility of both the Narran filling and Narran re-filling rule, modelling established the number of times each rule would have been triggered during the modelled simulation period (1895-2016). It was found that the Narran filling rule applied to 119 flow events and the Narran re-filling rule applied to 12 events. Given the relatively few times which the modelled Narran re-filling rule occurred, compared to the filling rule, it was determined that a single rule would be appropriate to achieve equivalent environmental outcomes and would simplify operations.

As the intent of the Narran rule was to support bird breeding, the new, simplified trigger still had to consider historical breeding events. Records of 18 bird breeding events on Narran Lakes dating back to 1971 were correlated with flows at the gauge at Jack Taylor Weir. All bird breeding events occurred at flows of 20,000 ML per day or more at Jack Taylor Weir, with the exception of one event in 1978. Based on this association, 20,000 ML per day was selected as the trigger volume to activate the rule.

To maintain the same level of environmental protection provided by this rule and the flow event management rules generally, it was necessary to extend the operation of the rule by one month from 1st April to 31st August to 1st of March and 31st August. This change counteracts the increase in consumptive diversions as a result of changing the flow threshold.

For noting, other scenarios were run which triggered at flow in excess of 20,000 ML per day in an attempt to extend the operations of the rule to the entire year; given that more recent science has established that bird breeding is not limited to the winter months. While this had merit in principle, it was not possible due to the interaction with the other flow event management rules and the underlying requirement to maintain the level of environmental protection through these rules.

The preferred rule identified was:

For any flow event equal to or more than 20,000 ML per day at the Jack Taylor Weir gauge between 1st March and 31st August, the rate of take of water harvesting entitlements be reduced by 10% for a maximum of 10 days.

Maintaining the level of protection for PEW

Under the Basin Plan 2012 (s10.28), Queensland must not reduce the level of protection for planned environmental water (PEW). PEW in the Condamine-Balonne plan area is the remaining share of the water resource that is not in the consumptive water share. The reductions in take that apply under flow event management are considered to be PEW.

Key considerations in determining whether a reduction in the level of protection of PEW has occurred are the level of legal protection, and changes in the quantity and/or effectiveness of PEW.

Changes in the level of legal protection

Prior to the commencement in December 2016 of the new planning framework in the *Water Act 2000*, the flow event management rules were located in the 2003 water plan and then duplicated in the Resource Operations Plan. Under the new planning framework, elements of the flow event management rules have transitioned onto the Water Plan, Water Management Protocol, Resource Operations Licence and Operations Manual.

Although the provisions will be located in different instruments with differing levels of approval, they must all be consistent with the water plan, and specifically the environmental outcomes, strategies and measures in the Plan. The water plan states the following relevant environmental outcomes:

- to maintain and if possible improve flows of water to which this plan applies that support bird breeding at Narran Lakes and;
- to maintain and, if possible, improve flows of water to which this plan applies that support floodplain ecosystems within and downstream of the plan area, including— (iii) Narran Lakes.

The level of legal protection is therefore maintained.

Changes in the quantity and/or effectiveness of PEW

For the assessment of changes in the quantity and effectiveness of PEW, the full set of flow event management rules (low, medium and Narran) must be considered. This is because of interactions between them – if the Narran rule now applies on different events, that can result in the other rules applying to events where the Narran rule applied previously. The impact of the new rule, in combination with all flow event management rules, was tested using scenario *1711I-Rev6* of the IQQM hydrologic model for the simulation period 1895 to 2013.

Quantity

It is not possible to amend any rule without impacting on the volume of diversions and volume of PEW to some extent. As a result, it was important to ensure that the new rule was consistent with the water allocation security objectives (WASOs), which are set out in the 2019 water plan (s28) to protect water allocations.

Under all simulation periods the difference between the current rule and the proposed rule was no greater than 0.1% of diversions and was considered acceptable given the overall accuracy of the hydrological model.

Effectiveness

It is important that planned environmental water also maintains the same level of effectiveness in achieving environmental outcomes. This means that it must still be provided at a time and flow threshold consistent with achieving the same environmental outcomes as realised under the previous 2003 rules.

The environmental flow objectives (EFOs) in the 2019 water plan (s26) cover a range of flow thresholds and timescales relevant to the environmental water requirements of key ecological assets. A comparison of both the current and proposed flow event management rules against the new 2019 water plan EFOs on the Narran, Culgoa, Bokhara, and Ballandool Rivers found no change to 22 EFOs. There was a slight positive change to the floodplain EFO on the Bokhara River and to the fish migration EFO on Briarie Creek, and one extra flow through event during the simulation period. These results confirmed that the new 2019 rule would maintain or enhance the effectiveness of PEW in the Condamine–Balonne.

Consultation

The recommended option has been consulted upon with the Lower Balonne Water Network, the Murray–Darling Basin Authority, the Department of Primary Industries (NSW), the Office of Environment and Heritage (NSW), and the Commonwealth Environmental Water Holder. The recommended option was subject to an independent review undertaken by OD Hydrology on for the Lower Balonne Water Network (funded by Smartrivers, the St George Water Harvesters and Dirranbandi District Irrigators Association). In addition, the proposed rule was included in the release of the draft Water Plan to the public on 11 April 2018.

Conclusion

The 2003 Narran rules, based on real time hydrological modelling, have been difficult to implement in practice. A simpler method, which could be implemented by the operator in real-time was needed in order to ensure that the rules were providing the level of environmental protection that was intended. As such, the new proposed rule was developed and modelling demonstrated that it would result in a more practical trigger, while retaining the same environmental and economic outcomes. This rule change has been extensively consulted on and has been incorporated into the final 2019 water plan.