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Review of Victoria's North and Murray Water Resource Plan

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The Wentworth Group of Concerned Scientists welcomes the opportunity to review and provide feedback on the draft Victoria's North and Murray Water Resource Plan (WRP). This water resource plan outlines how Northern Victoria and Victorian Murray surface water resources as well as Goulburn-Murray groundwater resources will be managed in-line with the Murray-Darling Basin Plan. The Plan sets out the rules and arrangements relating to annual limits on water take, environmental water requirements, as well as monitoring and compliance. As such when it is eventually accredited, it will drive on-the-ground implementation of the Basin Plan over a large part of Victoria.

Wentworth Group has reviewed the draft WRP using nine criteria which, from a scientific standpoint, are required to achieve outcomes described in the Water Act 2007 (*Cth*) and Basin Plan 2012 (*Cth*). A detailed description of these criteria, which go beyond the legislated WRP requirements in chapter 10 of the Basin Plan, can be found in Wentworth Group (2018).

Our review shows that the draft WRP does meet some of the criteria. However, our review has also identified several substantive problems with the draft Victoria's North and Murray WRP, detailed in the conclusion, with the most significant summarised as:

1. The Baseline Diversion Limit (BDL) has not been updated, which will result in an additional 32.15 GL of water being extracted for consumption each year, instead of being used to support riverine health;
2. The WRP does not provide adequate information to demonstrate how planned environmental water will be protected and how environmental objectives will be met; and
3. All models used in the WRP need to be thoroughly documented and subject to independent review and accreditation. This includes the BDL model, the final WRP model, modelling of the expected use of environmental entitlements as well as any updated models used in the WRP.

We submit that the WRP should not be accredited until these matters have been properly addressed. To do so would ignore requirements of the Water Act and Basin Plan related to: the appropriate calculation of the BDL as per schedule 3 of the Basin Plan (BDLs for surface water SDL resource units) and the definition of BDL in section 1.07; achievement of flow indicator levels as per Basin Plan 10.17 (1) "A water resource plan must be prepared having regard to whether it

is necessary for it to include rules which ensure that the operation of the plan does not compromise the meeting of environmental watering requirements of priority environmental assets and priority ecosystem functions;" and use of independently reviewed and accredited models as per Basin Plan 10.49 "A water resource plan must be based on the best available information."

In addition, the MDBA should also put in place systems to ensure that implementation and compliance of the WRPs will ultimately deliver the environmental health benefits required in the Basin Plan. The translation plans into on-the-ground actions is historically where the MDBA and basin states have a poor track record. The MDBA should therefore also ensure that the following systems are in place prior to the WRP being accredited:

1. Implementation systems to ensure the amount of water shown to be recovered in the models ends up in the rivers;
2. Compliance and enforcement systems to ensure new rules are followed and to avoid and prosecute illegal take of water; and
3. Monitoring, evaluation and oversight systems to track progress on expected outcomes and ensure the WRPs are delivering the Basin Plan's expected outcomes.

Review against Criteria

- 1. The Baseline Diversion Limit (BDL) used for calculating the Sustainable Diversion Limit (SDL) accurately describes the diversion limit that applied before the recovery of water for the Basin Plan.**

Except for take from the regulated River Murray, the WRP contains updated estimates of the BDLs. The updated BDL for the River Murray is still being developed with the Murray-Darling Basin Authority (MDBA).

The updated BDLs for basic rights, runoff dams and commercial plantations have been estimated in a logical manner. These items are not metered and their annual take will always be set to their permitted take unless there is an increase in the number of dams, the number of licences issued or the area of plantations. Reasonable estimates have been made of the baseline numbers and areas as at 2009. As such the updated BDLs for these items appear to be reasonable.

The updated BDLs for take from a watercourse (excluding basic rights) has been set equal to the sum of the entitlements. This would appear to overstate the Cap limit which is based on 1993/94 development given that in regulated systems the average take is generally considerably less than the average annual allocation. In 2015/6 and 2016/7 Victorian irrigators used 73% and 68% respectively of the water lawfully accessible to them (MDBA, 2018). If the annual take for this category of user was to be set to the SDL each year, then the impacts of this inflated BDL would be limited. However, most of these diversions are monitored and the annual take by these users will come from the diversions recorded on the Victorian Water Register. This is likely to result in SDL credits being generated by this group of users which could enable growth to occur elsewhere in Victoria. Victoria claims that it is not cost-effective or fit-for-purpose to develop a simulation model for the small volume of SDL associated with this form of take. However, the total proposed BDL for this category of use is 120.2 GL/year which is 3% of the total 3,880 GL SDL covered by this WRP. If historical usage data is available for these users it would be a simple matter to develop a regression model which could account for rainfall and be set to the current level of utilisation.

The BDLs for take from regulated rivers (excluding basic rights) appear to be largely unchanged from the figures in the Basin Plan.

For Victoria the 2009 BDL for regulated rivers should be equal to:

- The Cap based on 1993-94 levels of development,
- Less the adjustments for the inter-valley and interstate permanent trade in water entitlements (limited inter-valley permanent transfers of water entitlements were permitted up until June 2007),
- Less the reduction resulting from water recovery for The Living Murray project,

- Less the reduction resulting from the water recovery by Water for Rivers (WfR) for environmental flows in the Snowy and Murray Rivers.

There are several reasons why the Basin Plan estimates for regulated river BDLs should have been revisited. These include:

- Minor corrections to data on water trades,
- Small changes to the estimates of the Cap adjustment required for TLM water recovery,
- Water for Rivers water recovery continued until 2012, additional volumes of water have been recovered by WfR after the Basin Plan BDL estimates were made. In order to preserve the commitment that water recovered by Water for Rivers does not reduce environmental flows in the Murray-Darling Basin, the Basin Plan estimates of the BDL should be revised to include all water recovered by WfR,
- The estimates of Basin Plan BDL were calculated using TLM Cap factors to assess the Cap adjustment for WfR entitlement purchases. Factors based on the average allocations are more appropriate given that the Snowy Required Annual Release is reduced by the volume of water allocated each year to the recovered entitlements. Allocation will always be greater than the average usage, and
- The recalibration and reaccreditation of the River Murray Cap model (MSM) in 2013.

The required adjustments associated with the first four dot points have been investigated in MDBA (2014). A comparison of the best 2014 estimates of the necessary adjustments to the Cap with the adjustments used in the development of the Basin Plan BDL model, as described in MDBA (2011), are shown in Table 1.

Table 1 Comparison of Cap adjustments used for Basin Plan BDL model with the 2014 best estimates of those adjustments.

SDL resource unit	2014 Best Estimate of Increase (GL) (MDBA, 2014)	Increase made in the preparation of BP BDL (GL) (MDBA, 2011)	Difference of Best Estimate less MDBA (2011) (GL)
NSW			
Lower Darling	-82.98	-67.00	-15.98
Murrumbidgee	-140.46	-95.90	-44.56
NSW Murray	-115.91	-115.00	-0.91
Total NSW	-339.35	-277.90	-61.45
Victoria			
Goulburn/Broken/Loddon/Campaspe	-321.31	-293.60	-27.71
Kiewa/Ovens/Victorian Murray	-4.43	0.00	-4.43
Total Victoria	-325.75	-293.60	-32.15
South Australia			
Murray	-10.10	-11.00	+0.90
Total	-675.19	-582.50	-92.69

The modelled BDL is the basis for defining the SDL. It is therefore important that it accurately represents the diversion limit prior to bridging the gap.

Recommendation 1: The Victorian BDL estimates for the regulated Victorian Murray and the Goulburn systems should be reassessed using the best estimates of the Cap adjustments due to trade, TLM and Water for Rivers. This would reduce the Goulburn BDL by 27.71 GL/year and the Victorian Murray BDL by 4.43 GL/year. The implication of not correcting the BDL means that there will be an erroneous addition of up to 32.15 GL of water which can be extracted for consumption each year rather than being left in the rivers to support riverine health.

Recommendation 2: The modelled BDL is the basis for defining the SDL, therefore, all BDL models should be thoroughly documented and subject to independent review and accreditation.

2. Water Resource Plans enable achievement of the agreed hydrological objectives and support the ecological objectives described in the Basin Plan and related documents.

Section 10.17 (1) of the Basin Plan states that: *“A water resource plan must be prepared having regard to whether it is necessary for it to include rules which ensure that the operation of the plan does not compromise the meeting of environmental watering requirements of priority environmental assets and priority ecosystem functions.”*

To assess whether this criterion has been met it would be necessary to test the output of the WRP model against the environmental flow targets at the hydrological indicator sites used in the development of the Basin Plan and in the determination of the SDL adjustments. However the development of the final WRP model has been deferred until uncertainties associated with the

Goulburn-Murray Water Connections Project, the New Goulburn Constraints Measure and the way that the recovered environmental water will be used, have been resolved.

For now, an Interim WRP model has been proposed. In this model, management changes made since June 2009 such as carryover and the updated reserve policy, have been included but diversions are set to BDL levels. When this model is used for determining the permitted take, modelled diversions will be scaled down to account for the recovery of the environmental entitlement purchased by the Commonwealth Government to 'bridge the gap'.

Because the Interim WRP model does not model SDL conditions, it cannot be used to assess whether the environmental flow targets at Basin Plan hydrological indicator sites will be met under the WRP. In addition, key policies regarding the channel capacity constraints between Hume and Yarrawonga, in the Barmah-Millewa Forest and in the Goulburn River at Shepparton are reported in the WRP to be '*in their early development*' and requiring '*ongoing community consultation*'. Given that the channel capacity constraints that have been imposed on the delivery of environmental water since 2009 are much more severe than was assumed in the Basin Plan modelling, these constraints could significantly hinder the meeting of environmental targets.

The WRP contains the assertion that: "*It was not considered necessary to provide rules in response to the requirement under section 10.17 of the Basin Plan and therefore this requirement is not addressed below*" (DELWP, 2019b, p434). Given the lack of modelling and the uncertainty regarding key operating rules under the plan, it is considered that the justification for this assertion is very weak.

Recommendation 3: The final WRP model should be developed and tested before this WRP is accredited. Without the final WRP model there is insufficient information within this WRP to determine if the environmental flow targets required in the Basin Plan will be met.

Recommendation 4: That the Victorian Government put a high priority on implementing its responsibilities under the Constraints Management Strategy in order to effectively deliver water for the environment.

3. No net reduction in 'planned' environmental water

Appendix E of the WRP describes in detail the limited amounts of planned environmental water in the Northern Victoria Water Resource Plan area. It also provides details of the conditions applying to its use. The planned environmental water in Victoria is used to maintain minimum flows in the Broken, Goulburn and Ovens Rivers. Insofar as it is needed to meet those minimum flows, the planned environmental water seems to be adequately protected by these conditions.

There is no designated 'planned environmental water' in the Victorian Murray Water Resource Area although the Murray-Darling Basin Authority operates the system under its control to guarantee minimum flows at many locations in this area.

Observation 1: Inconsistencies in terminology such as what constitutes planned environmental water may permit an erosion of protections for this water category. There is a need to have greater Basin-wide consistency in water terminology to ensure WRP accreditation requirements can be adequately assessed.

4. All environmental water ('planned' and 'held' under entitlement) must be protected within and between valleys, including over state borders

In the regulated Victorian system, the supply of all water entitlements, including held environmental water, is subject to orders being made for water and those orders being met by releases from storage. In the situation where the environment requires a specific flow at a point, the volume debited to an environmental entitlement to meet that flow will be reduced by the order for irrigation water downstream. Unlike the situation in some unregulated northern rivers, access by irrigators to water in the Victorian regulated system is not dependent on the flow in the river.

The treatment of environmental entitlements is handled by a hierarchy of other plans and strategies including:

- The Basin-wide environmental watering strategy,
- The Victorian watering management strategy,
- The regional watering strategy,
- The annual Basin and state watering priorities,
- The seasonal watering priorities,
- The seasonal watering plan.

The seasonal watering plan will have options for a range of different scenarios (dry, average, wet) but the decisions will be made day to day. Most of the targets set out in the documents above do not define specific target flows and frequencies. Therefore, it is likely that modelling the operation of this hierarchy will only be possible once there is sufficient data to enable the actual behaviour of the environmental managers to be analysed.

The fact that no attempt has been made to date to model the expected use of environmental entitlements is disappointing given that a successful environmental strategy can only be developed if it takes into account the probabilities of success and failure of individual decisions which would be best assessed by analysing a long climatic record.

The effectiveness of held environmental entitlements is increased by the implementation of the prerequisite policy measures (PPMs) which enable the environment to utilise return flows, route downstream orders through environmental sites and to piggyback environmental releases on top of surplus flows. These PPMs are described in the WRP but are proposed to be made enduring, fully operable and transparent by a Victorian policy document to be released by June 2019.

Systems including end-of-valley accounts and rules for the transfer of environmental allocations similar to those used for the temporary trade of consumptive entitlements are already in place

for the transfer of environmental allocation between valleys and between states. For these reasons it is considered that held environmental water is adequately protected by the Victorian WRP.

Recommendation 5: The WRP should include details and outcomes related to the modelling of the expected use of environmental entitlements.

Observation 2: The PPM implementation cannot be fully evaluated at this time as the relevant policy document is not yet public.

Recommendation 6: That the Victorian Government commit to its program of incorporating prerequisite policy measures.

5. Each Water Resource Plan should set out the steps that are to be taken to monitor each of the components of the SDL which are currently not metered.

MDBA (2018) reported that 98% of the take from Victorian regulated streams and watercourses and 80% of the total surface water take was metered in 2016-17. The components of the surface water take that are unmetered include basic rights, runoff dams and forest plantations. These make up about 8% of the Victorian surface water BDL. Victoria has developed models and conducted studies to estimate the long term average use by those components and these have been used to update the BDLs. However Victoria has argued that the uncertainties in these methods make them unsuitable for regular monitoring. They do not propose to extend monitoring to these components and their annual take will be set to the SDL each year.

MDBA (2018) reported that 72% of the Victorian groundwater take was monitored in 2016-17. Take under basic rights is generally not metered. Victoria has rules which require monitoring for all new licences and for all groundwater entitlements greater than 20 ML. The groundwater take in some districts is estimated by reference to a subset of bores in the district that are monitored.

Observation 3: The approach to monitoring described in the WRP appears reasonable, however the Victorian Government should strive to improve monitoring of the unmetered surface and ground water components.

6. Each Water Resource Plan should ensure that water recovery is not undermined by growth in extractions.

Each year, Victoria will report the permitted and actual take for each of its SDL resource units. The MDBA will calculate the cumulative SDL debits and credits. If an SDL debit exceeds 20% of the SDL then Victoria will need to be granted a reasonable excuse if it is not to be declared in breach of the SDL. The requirements for obtaining a reasonable excuse are set out in the Sustainable Development Reporting and Compliance Framework (MDBA, 2018b). If the cumulative debit exceeds the 20% limit for more than two years, reasonable excuses will only be granted if the MDBA approves a Victorian growth-in-use strategy to bring diversions back to the SDL.

The WRP notes this process and states that if a growth-in-use strategy is required it will be developed at the time in consultation with stakeholders. They note however that growth-in-use strategies will not apply to take from a watercourse (excluding basic rights) since for these users the SDL will equal the entitlement.

Observation 4: Although it would be useful if the general principles for developing growth-in-use strategies were set out beforehand in the WRP, the process for managing to the SDL seems reasonable.

7. Each water resource plan must not compromise groundwater dependent assets, nor connectivity between groundwater and surface water systems.

The WRP contains provisions for reviewing applications to grant new groundwater licences or to transfer existing licences in order to protect groundwater dependent ecosystems and to maintain connectivity with surface water systems. If an application is deemed to have a medium or high risk of having an adverse impact on a groundwater dependent ecosystem then a range of conditions can be placed on that application to protect those systems.

Observation 5: It is considered that the provisions related to the protection of groundwater assets and connectivity with surface waters are adequate.

8. All models used to inform decisions should be up to date and accredited against standards. There should be no change to the baselines, rules and assumptions without a systematic, independent and publicly available review.

As noted above, Victoria proposes to use Interim WRP models until such time as there is greater certainty on a number of issues including the way in which the recovered environmental water is delivered. The Interim WRP models will incorporate changes to water management rules made after 30 June 2009 such as carryover and the updated reserve policy but it will be set so that diversions average the BDL over the 1895-2009 period.

In compliance mode, these models will generate a 'BDL target' diversion each year which will then be scaled down outside the model to a value appropriate for the SDL at the time.

The consequence of using the Interim model is the assumption that environmental entitlements will be used and consumed in the same pattern as other entitlements. As this is unlikely to be the case, artificial fluctuations will be added to the compliance assessment process making it more difficult to detect trends in take.

The Goulburn System Model (GSM) which will be used for the Goulburn, Broken, Loddon and Campaspe Rivers has been reviewed and accredited for Cap purposes but it has been updated since. No mention is made in the WRP for the updated Interim WRP GSM model to be reviewed or accredited.

The Source Murray Model (SMM) is a new model that is being developed by the MDBA. This will be used for the Murray, Ovens and Kiewa Rivers. It is likely that the BDL version of SMM will be

adjusted to meet a BDL target for 1895-2009 derived from the old Monthly Simulation Model (MSM) of the River Murray. MSM has been reviewed and accredited for Cap purposes but there is no discussion in the WRP of the process for reviewing and accrediting SMM for testing SDL compliance.

With regard to the integrity of the SDL process, accreditation of the SDL model will be less important than the accreditation of the Cap model was to the Cap. This is because the Cap model determined the long term diversion limit. The SDL model will be adjusted to meet a long term diversion limit derived elsewhere. For Victoria, the SDL limit will be the limit derived from the Cap model less adjustments for permanent trade, TLM, Water for Rivers and the recovery of water to bring the BDL to the SDL. Provided that average diversion of the WRP model equals the SDL over 1895-2009 then the consequences of an inaccurate model will be uncertainty in the compliance process. This variability will reduce confidence in the detection of trends in diversion.

In addition to testing compliance with the SDL, there is a role for models in the adaptive management required by Chapter 13 of the Basin Plan to make the most effective use of the environmental water. To assess the effectiveness of the plan, it is first necessary to determine how the flow regime has changed since the adoption of the Basin Plan. This would best be done by running an approved BDL model to estimate the 'without plan' river flows since 2009. To do this, the data required to run the model will need to be updated each year, but this process should have already occurred to enable the Interim WRP model to be run.

Recommendation 7: That the BDL models should be run at the end of each year using data updated to the end of the year to assist the adaptive management of environmental water by defining "before plan" conditions.

Recommendation 8: The WRP should detail the process for reviewing and accrediting all of the updated models used in the WRP.

9. Accreditation of water resource plans should be subject to independent and publicly available review.

The Wentworth Group welcomes the opportunity to review and comment on the draft WRP for Victoria's North and Murray Regions. We encourage the Victorian Government to continue to make the accreditation of the WRP a transparent process.

Conclusion

Wentworth Group has reviewed the draft Victoria's North and Murray Water Resource Plan using nine criteria which are required from a scientific standpoint to achieve outcomes described in the Basin Plan. These criteria go beyond the legislated WRP requirements in chapter 10 of the Basin Plan. Although the draft WRP is a comprehensive document, it fails to satisfy some scientific requirements of the Basin Plan. Wentworth Group recommends correcting the following substantive issues before the WRP should be considered for accreditation.

Recommendation 1: The Victorian BDL estimates for the regulated Victorian Murray and the Goulburn systems should be reassessed using the best estimates of the Cap adjustments due to trade, TLM and Water for Rivers. This would reduce the Goulburn BDL by 27.71 GL/year and the Victorian Murray BDL by 4.43 GL/year. The implication of not correcting the BDL means that there will be an erroneous addition of up to 32.15 GL of water which can be extracted for consumption each year rather than being left in the rivers to support riverine health.

Recommendation 2: The modelled BDL is the basis for defining the SDL, therefore, all BDL models should be thoroughly documented and subject to independent review and accreditation.

Recommendation 3: The final WRP model should be developed and tested before this WRP is accredited. Without the final WRP model there is insufficient information within this WRP to determine if the environmental flow targets required in the Basin Plan will be met.

Recommendation 4: That the Victorian Government put a high priority on implementing its responsibilities under the Constraints Management Strategy in order to effectively deliver water for the environment.

Observation 1: Inconsistencies in terminology such as what constitutes planned environmental water may permit an erosion of protections for this water category. There is a need to have greater Basin-wide consistency in water terminology to ensure WRP accreditation requirements can be adequately assessed.

Recommendation 5: The WRP should include details and outcomes related to the modelling of the expected use of environmental entitlements.

Observation 2: The Prerequisite Policy Measures implementation cannot be fully evaluated at this time as the relevant policy document is not yet public.

Recommendation 6: That the Victorian Government commit to its program of incorporating prerequisite policy measures.

Observation 3: The approach to monitoring described in the WRP appears reasonable, however the Victorian Government should strive to improve monitoring of the unmetered surface and ground water components.

Observation 4: Although it would be useful if the general principles for developing growth-in-use strategies were set out beforehand in the WRP, the process for managing to the SDL seems reasonable.

Observation 5: It is considered that the provisions related to the protection of groundwater assets and connectivity with surface waters are adequate.

Recommendation 7: That the BDL models should be run at the end of each year using data updated to the end of the year to assist the adaptive management of environmental water by defining “before plan” conditions.

Recommendation 8: The WRP should detail the process for reviewing and accrediting all of the updated models used in the WRP.

As part of the Basin Plan implementation process Wentworth Group recognises that WRP accreditation is only the first step of a detailed process which requires extensive monitoring, compliance and oversight. This provides the most substantial challenge in terms of translating the WRP text to on-the-ground actions needed to restore the Basin’s environmental health. These processes are also where the MDBA and basin states have shown poor resolve. The MDBA should therefore also ensure that the following systems are in place prior to the WRP being accredited:

- Implementation systems to ensure the amount of water shown to be recovered in the models ends up in the rivers;
- Compliance and enforcement systems to ensure new rules are followed and to avoid and prosecute illegal take of water; and
- Monitoring, evaluation and oversight systems to track progress on expected outcomes and ensure the WRPs are delivering the Basin Plan’s expected outcomes.

References

- DELWP (2019) Victoria's North and Murray Water Resource Plan – Summary Report, Victorian Department of Environment, Land, Water and Planning, January 2019.
- DELWP (2019b) Victoria's North and Murray Water Resource Plan – Comprehensive Report (Draft for Comment), Victorian Department of Environment, Land, Water and Planning, January 2019.
- MDBA (2010) Water Audit Monitoring Report 2008-09, Murray-Darling Basin Authority, April 2010.
- MDBA (2011) Comparison of watercourse diversion estimates in the proposed Basin Plan with other published estimates. (Supporting information for the preparation of the proposed Basin Plan), Murray-Darling Basin Authority technical Report 2011/01 Version 2, November 2011.
- MDBA (2014) Derivation of Version 10.8 Long Term Diversion Limit Equivalence Factors – A companion document to the history of LTDLE Factors, Murray-Darling Basin Authority, November 2014.
- MDBA (2018) Transition Period Water Take Report 2016-17 Report on Cap compliance and transitional SDL accounting, Murray-Darling Basin Authority, June 2018.
- MDBA (2018b) Sustainable Diversion Limit Reporting and Compliance Framework Summary, Canberra: Murray-Darling Basin Authority, November 2018.
- Wentworth Group of Concerned Scientists (2018) Proposed Criteria for Assessing Water Resource Plans under the Murray-Darling Basin Plan, November 2018.