

LTAEL compliance assessment for Barwon Darling unregulated river

Executive Summary

This report describes the methods used to assess if extractions in the Barwon Darling Unregulated River Water Source are compliant with the limit described in the water sharing plan. The assessment has found that long term average annual extractions are compliant for the 2022/23 water year.

Background and Purpose

The Water Sharing Plan for the Barwon-Darling Unregulated River Water Source requires an assessment of compliance with a Long-term Average Annual Extraction Limit (LTAEL). The LTAEL is sometimes referred to as the 'plan limit'.

The assessment is to be carried out annually by the Department¹ on behalf of the Minister following the end of each water year. LTAEL compliance requires two models; one to represent the LTAEL and one to represent current conditions. The long-term results from both models are compared to assess compliance.

Each water sharing plan defines the LTAEL, how the compliance assessment is to be completed, triggers for non-compliance and subsequent compliance action. The LTAEL includes multiple types of water use. However, the compliance assessment is based on the total.

This report summarises a compliance assessment for the Barwon-Darling unregulated river water source. The assessment was based on best available models, using climate data from 1895 to 2022.

Scenarios and agreed model version

Model scenarios for Cap, water sharing plan and current conditions were selected based on evaluation against multiple criteria, including whether these had been documented and independently reviewed, how appropriate the management and levels of development are, and consistency of the hydrology. For the Barwon-Darling Unregulated River Water Source, the selected model scenarios reported in Table 1 are the most appropriate for LTAEL compliance purposes.

The scenarios are based on the model scenario used for both the Cap and the water sharing plan to set the LTAEL, and the annual permitted take model used for sustainable diversion limit compliance assessment as part of the Murray Darling Basin Plan.

¹ Refers to the current Department of Climate Change, Energy, the Environment and Water (DCCEEW), as well as its predecessor(s) and likely successor(s) over the life cycle of each WSP).

Table 1 Model scenarios selected for Barwon-Darling unregulated river water source for LTAEL assessment purposes

Model scenario	System file
Cap and water sharing plan (WSP) conditions	LTAEL_2023.sqq
Current conditions	APT_FPH_17_Uncon_23Curr.sqq

LTAEL compliance results

LTAEL assessment

The LTAEL is the modelled long-term average annual extractions over the modelling period 1895-2023 using the Cap/WSP scenario model. The results of this analysis are reported in Table 2. The LTAEL for 2022/23 water year for Barwon Darling Unregulated River Water Source is 204.8GL. There are also unmodelled extractions estimated at 5.8 GL/y. These unmodelled estimates have not changed and are not included in LTAEL compliance assessment.

Table 2 Modelled and unmodelled long term average annual extractions (1895-2023) for Cap/WSP model scenarios (GL/y)

Extraction category	Cap/WSP Scenario
A Class	1.13
B Class	132.8
C Class	50.5
Floodplain harvesting ²	20.4
Total modelled extractions	204.8
Basic Rights	0.8
Town Water Supply	2.3
Stock and Domestic	2.7

Compliance assessment

Compared to the LTAEL scenario, the modelled long term average annual extractions from the current conditions model scenario are reported in Table 3. The current water sharing plan defines non-compliance if extractions under current conditions exceeds LTAEL by 3% or more.

² Floodplain harvesting estimated by the model and is estimated by the addition of overbank flow and non-exempt rainfall runoff harvesting.

Note that plan limit compliance is assessed on total extractions and not by individual forms of take. The results in Table 3 show current levels of diversions less than LTAEL, and therefore the Barwon Darling Unregulated River Water Source is compliant with the LTAEL. The key reasons for differences between current and LTAEL scenario results are:

- The previous annual volumetric licences were converted to individual shares of the long-term valley Cap as part of establishing the 2012 water sharing plan. This reduced licences to roughly 1/3 of the previous size.
- Some Cap shares were assigned to inactive water users which creates systemic underuse.
- Some irrigation businesses (generally smaller farms) ceased operations during the millennium drought.

Table 3 Modelled long term average annual extractions (1895-2023) for Current and LTAEL scenarios (GL/y)

Extraction category	LTAEL scenario model	Current conditions scenario model
A Class	1.1	6.9
B Class	132.8	111.5
C Class	50.5	24.3
Deemed HEW usage	n/a	30.4
Floodplain harvesting	20.4	25.4
Total modelled extractions	204.8	198.5

Held environmental water (HEW) entitlements were used extensively in the Barwon-Darling for the first time during the 2020/2021 water year. Environmental uses are not yet included in the model. However, it is apparent based on recorded usage data in this year that environmental water managers can fully utilise their entitlements. Based on this, full utilisation has been adopted for LTAEL compliance purposes as discussed later in this report.

Comparison with 2021-2022 assessment results

The 2022-2023 LTAEL and annual permitted take (APT) assessment showed noticeable increases of up to 3% in total diversion when compared to the previous 2021-2022 assessment.

The increases were due to model change including an upgraded version of the LTAEL and APT models and the correction to use SILO EvSp data set instead of EVAP data set.

In recent years, we have been getting a new rainfall and EVAP time series from SILO each year, then following the documented procedure generating the evaporation in IQQM using the documented climate stations. Using SILO EVAP data set creates a problem as the IQQM generating method is based on perturbing a long-term average annual type figure with a correlation to rainfall. So, wet days have less evaporation loss. The problem is that from 1890 to 1970 there is no correlation to be found because the “observed pan” being fed in has no rainfall signal within it.

The correct procedure is to use SILO EvSp data set and apply the documented procedure. Table 4 demonstrates the percentage difference between IQQM generated evaporation files using EVAP data set in the 2021/2022 compliance run and the same using EvSP data set in the 2022/2023 compliance run. The percentage differences are minimal with 052026 having the greatest difference being 6% more evaporation using EvSp.

Table 4 Percentage difference in IQQM generated evaporation using evap and EvSp

Evaporation site	2021/2022.evap vs 2022/2023.evsp percentage difference for 1895 to 2022
048239	6%
047058	5%
048027	-0.01%
053048	-0.02%
052026	3.6%

Even though the difference in SILO evaporation are notable, the approach for this assessment was always to use the best available data at the time. This difference in SILO evaporation does not void this compliance assessment since the same evaporation files are used in both LTAEL and APT models.

The LTAEL and APT models used for the 2021/2022 compliance were also based on the older Barwon Darling ‘IQQM’ model i.e., prior to the work done for the Healthy Floodplains Project. The LTAEL and APT models used for the 2022/2023 compliance uses the newer model scenarios that include detailed floodplain harvesting that has been reviewed and submitted for WRP accreditation with MDBA. Appendix A of this report provides a comparison between the newer model to the 2021/2022 compliance assessment results.

Modelled compliance action

No compliance action is required as the LTAEL assessment shows compliance.

Supporting Information

Results over Basin Plan assessment period

The results over the Basin Plan assessment period of 1895-2009 reported in Table 56 are included for reference only. These results will be used to track the degree to which future model updates change these long-term averages.

Table 5 Modelled long term average annual extractions (1895-2009) for Current and LTAEL scenarios (GL/y)

Extraction category	LTAEL Scenario	Current Scenario
A Class	1.16	6.9
B Class	131.6	111.5
C Class	51.7	24.3
Deemed HEW usage	n/a	30.4
Floodplain harvesting ¹	19.8	25.3
Total modelled extractions	204.4	199.9

¹This includes Overbank Flow (OBF) and non-exempt Rainfall Runoff Harvesting (RRH)

Usage by Held Environmental Water Entitlements

Tables 3 and 6 reported estimates for held environmental water usage in the current conditions model scenario. These were used for LTAEL compliance purposes. The Basin Plan intends to recover entitlements for this purpose equivalent to 32 GL/year of long-term usage. Current recovery is 1.6 GL/year short of this target. We expect that held environmental water entitlements will be actively used over the longer term to meet environmental objectives.

No environmental water use was recorded prior to 2021/22, and our current conditions scenario model has represented environmental water use by making the model nodes with these entitlements inactive. This representation still protects the long-term value of the entitlements from extraction by other entitlement holders because the entitlements were issued as a long-term share of Cap.

Environmental water managers used 55% of their entitlements over the 2022/2023 year. Their actual usage is detailed in Table 6.

This is a single year of usage, however, a dedicated environmental water manager for the Barwon-Darling is appointed and we believe it is reasonable to assume the held environmental water portfolio will be actively used with an average utilisation level of 100%.

For the 2022/23 LTAEL compliance assessment we are assuming long-term utilisation of these licences will equal 30.4 GL/year on average based on 2022/2023 usage data

Table 6 2022/23 Environmental water share and use by Water Access Licence

Water Access Licence	Category	Share (ML)	2022/23 usage (ML)
33752	A	109	0
33701	A	51	153
33704	A	22	66
33784	B	1,566	900.6

Water Access Licence	Category	Share (ML)	2022/23 usage (ML)
33762	A	41	0
33743	B	51	0
33619	B	9,252	7147.2
33798	C	6,963	0
33621	A	39	0
35943	C	5,535	0
35944	B	1,188	683.7
36273	Unregulated river	1,488	0
37353	B	0	0
37461	B	323	824.7
37810	B	3,731	7091.8
Total		30,359	16,867
Total usage / total shares			0.55

Appendix A

The models used for the compliance assessment runs for the old and new Barwon-Darling models are described in Table 7.

Table 7 Model scenarios selected for compliance assessment

Model scenario	System file_old model	System file_new model	Run difference between old and new model
Cap and water sharing plan (WSP) conditions	LTAAEL_2022.sqq	LTAAEL_2023.sqq	Added the following irrigation nodes the floodplain harvesting List Quan: N007,N137, N398, N049, N062, N063, N120.

Model scenario	System file_old model	System file_new model	Run difference between old and new model
Current conditions	DarlAPT01_22Curr.sqq	APT_FPH_17_Uncon_Curr.sqq	<p>Added the following irrigation nodes to the floodplain harvesting List Quan:</p> <p>N636, N398, N049, N062, N063, N120</p> <p>Added irrigation nodes N636 (West Mooculta) to B class List Quan as diversion recorded show they diverted water in 2021/2022.</p>

In addition to the changes provided in Table 7, whilst some parameters such as irrigation licence entitlement and river pump capacity remain unchanged between the old and new model scenarios, there were some improved model parameters used as a result of the Healthy Floodplains Project. For more detail, please refer to the published report ‘Building the river system model for the Barwon Darling Valley unregulated river system, Conceptualisation, construction and calibration, May 2022’

https://www.industry.nsw.gov.au/__data/assets/pdf_file/0016/512503/model-build-report.pdf.

A summary of the changes made, compared to the old LTAAEL and APT scenarios are:

- Revised on farm storage capacity.
- Inclusion of regional rainfall runoff estimates for three properties.
- Floodplain harvesting representation in the model.
- Floodplain Harvesting pump capacity.
- On farms harvesting parameters
- Included undeveloped area in the model.
- Floodplain harvesting commence to pump threshold
- Floodplain harvesting entitlements applied.