

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 2021/22 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 Department of Planning and Environment - Water (as the delegate 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.

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_2022.sqq
Current conditions	DarIAPT01_22Curr.sqq

LTAEL compliance results

LTAEL assessment

The LTAEL is the modelled long-term average annual extractions over the modelling period 1895-2022 using the Cap/water sharing plan scenario model. The results of this analysis are reported in Table 2. The LTAEL for 2021/22 water year for Barwon-Darling Unregulated River Water Source is 197.8 gigalitres (GL). There are also unmodelled extractions estimated at 5.8 gigalitres per year (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 (1895-2022) for Cap/water sharing plan model scenarios (GL/y)

Extraction category	Cap/WSP Scenario
A Class	1.8
B Class	134.2
C Class	44.6
Floodplain harvesting ¹	17.2
Total modelled extractions	197.8
Basic Rights	0.8
Town Water Supply	2.3
Stock and Domestic	2.7

¹ Floodplain harvesting estimated by the model does not distinguish between overbank flow, exempt rainfall runoff harvesting, and non-exempt rainfall runoff harvesting.

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.

Note: 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 (1895-2022) for Current and LTAEL scenarios (GL/y)

Extraction category	LTAEL scenario model	Current conditions scenario model
A Class	1.8	7.1
B Class	134.2	107.9
C Class	44.6	32.6
Deemed HEW usage	n/a	30.4
Floodplain harvesting	17.2	17.6
Total modelled extractions	197.8	195.6

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 2020-2021 assessment results

The 2021-2022 LTAEL and Annual Permitted Take (APT) assessment showed noticeable increases of up to 5% in total diversion when compared to the previous 2020-2021 assessment. The increases were due to the changes in SILO evaporation and rainfall dataset leading to around about 15% difference between the data used for this 2021-2022 assessment and the previous 2020-2021.

Table 4 below shows the comparison between the 2020-2021 and 2021-2022 assessment for the common period (1895 to 2021). The result demonstrates the effect of the changes in SILO evaporation and rainfall dataset used in the models on diversions.

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

Table 4: Total modelled extractions for common period 1895 to 2021

	Extraction category	2020-2021 Results	2021-2022 Results
LTAEL scenario model			
	A Class	1.6	1.8
	B Class	129.9	134.3
	C Class	42.6	44.6
	Floodplain harvesting	16.7	17.0
Total modelled extractions		190.9	197.7
Current conditions scenario model			
	A Class	7	7.1
	B Class	101.6	107.8
	C Class	30.9	32.5
	Deemed HEW usage	30.4	30.4
	Floodplain harvesting	15.7	17.5
Total modelled extractions		185.6	195.3

Modelled compliance action

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

LTAEL and Compliance assessment using floodplain harvesting (FPH) models

The LTAEL and APT models used for the 2021/2022 compliance were based on the older Barwon-Darling 'IQQM' model i.e. prior to the work done for the Healthy Floodplains Project. The older 'IQQM' model was used as the newer model scenarios that include detailed floodplain harvesting are currently in review prior to formal adoption. For transparency, the compliance assessment runs

have been duplicated using the newer model. The total model extractions are provided in Table 5 for the new model scenarios i.e. LTAEL, Current with detailed floodplain harvesting and Current with detailed floodplain harvesting and entitlements applied. Appendix A of this report provides a comparison between the newer model to the 2021/2022 compliance assessment results.

Table 5: Total modelled extractions using the new FPH model scenarios

	LTAEL FPH Scenario	Current FPH Scenario	Current FPH with Floodplain Harvesting Entitlement Scenario
Total modelled extractions	203.6	163.5	163.7
Deemed HEW usage	Not applicable	30.4	30.4
Total modelled extractions	203.6	193.9	194.0

The newer IQQM scenarios also show that no compliance action would be required if the newer model scenarios developed for floodplain harvesting assessment had been adopted for use this year.

Supporting Information

Results over Basin Plan assessment period

The results over the Basin Plan assessment period of 1895-2009 reported in Table 6 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 6: Modelled long term average annual extractions (1895-2009) for Current and LTAEL scenarios (GL/y)

Extraction category	LTAEL Scenario	Current Scenario
A Class	1.9	7.1
B Class	138.6	109.5
C Class	45.8	33.6
Deemed HEW usage	n/a	30.4
Floodplain harvesting	16.6	17.0
Total modelled extractions	202.9	197.6

Usage by Held Environmental Water entitlements

Tables 3 and 4 reported estimates for held environmental water usage in the current conditions model scenario. These were used for LTAAEL 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 in 2019/20, 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 actively used all their entitlements over the 2021/2022 year, reaching the 300% annual use limit for several entitlements and averaging an overall 150% usage of entitlement shares. Their actual usage is detailed in Table 7.

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

For the 2021/22 LTAAEL compliance assessment we are assuming long-term utilisation of these licences will equal 30.4 GL/year on average based on 2021/2022 usage data.

Table 7: 2021/22 Environmental water share and use by Water Access Licence

Water Access Licence	Category	Share	2021/22 usage (ML)
33752	A	109	214.6
33701	A	51	153
33704	A	22	66
33784	B	1,566	4,698
33762	A	41	60.9
33743	B	51	121.8
33619	B	9,252	2,800
33798	C	6,963	13,530.5
33621	A	39	58
35943	C	5,535	16,605
35944	B	1,188	3,564
36273	Unregulated river	1,488	1488
37353	B	0	0

37461	B	323	186.2
37810	B	3,731	2,151.8
Total		30,359	45,697
Total usage / total shares			1.50

Appendix A

The models used for the compliance assessment runs for the old and new Barwon-Darling Models are described in Table 8.

Table 8: 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_2022a.sqq	Added the following irrigation nodes the floodplain harvesting List Quan: N007,N137, N398, N049, N062, N063, N120.
Current conditions	DarLAPT01_22Curr.sqq	APT_FPH_16_Uncon.sqq	Added the following irrigation nodes to the floodplain harvesting List Quan: N636, N398, N049, N062, N063, N120 Added irrigation nodes N636 (West Moolta) to B class List Quan as diversion recorded show they diverted water in 2021/2022.
Current conditions with FPH licence	Not applicable.	DarLAPT01_22FphLic.sqq	As above.

Comparison of the results of the compliance assessment runs are provided in Table 9.

Table 9: Run results comparison between old and new model scenario

	Extraction category	Old scenario 2021-2022 Results	New scenario 2021-2022 Results
LTAEL scenario model			
	A Class	1.8	1.1
	B Class	134.3	136.2
	C Class	44.6	49.9
	Floodplain harvesting ²	17.0	16.4
Total modelled extractions		197.7	203.6
Current conditions scenario model			
	A Class	7.1	6.9
	B Class	107.8	109.0
	C Class	32.5	32.5
	Deemed HEW usage	30.4	30.4
	Floodplain harvesting	17.5	22.7
Total modelled extractions		195.3	201.6
Current conditions with floodplain harvesting scenario model			
	A Class	Not applicable	6.9
	B Class	Not applicable	109.0
	C Class	Not applicable	32.5
	Deemed HEW usage	Not applicable	30.4
	Floodplain harvesting	Not applicable	22.2
Total modelled extractions			201.1

² This estimate does not include rainfall runoff harvesting which is now exempt under the Water Management (General) Regulation 2018 or non-exempt rainfall runoff harvesting.

The Plan limit number for the new LTAAEL model that includes detailed floodplain harvesting has increased to 203.6 GL/year compared to the old scenario of 197.7 GL/year. There is a small increase in the APT between the new and old model scenario.

The changes in results are due to changes in the model with detailed floodplain harvesting. 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': 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.