

LTAAEL compliance assessment for Gwydir Regulated River Water Source

Executive Summary

This report describes the methods used to assess if extractions in the Gwydir Regulated River Water Source are compliant with the limit described in the water sharing plan in the 2023-2024 water year. The assessment found that long-term average annual extractions were compliant in 2023-2024.

Background and Purpose

The water sharing plan for the Gwydir Regulated River Water Source requires an assessment of compliance with a Long-term Average Annual Extraction Limit (LTAAEL). The LTAAEL 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. LTAAEL compliance assessment requires two scenario models; one to represent the LTAAEL and one to represent current conditions. The long-term results from both scenario models are compared to assess compliance.

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

This report summarises a compliance assessment for the Gwydir Regulated River Water Source for the 2023-2024 water year. The assessment was based on best available models, using fully refreshed climate data from 1895 to 2024.

Scenarios and agreed model version

Model scenarios for Cap, WSP and current conditions were selected based on evaluation against multiple scenario model selection criteria, including whether these had been documented and independently reviewed, how appropriate the management and levels of development are, and the consistency of the hydrology. For the Gwydir Regulated River Water Source, the selected model

¹ Refers to the current Department of Climate Change, Energy, the Environment and Water (DEECCW), as well as its predecessor(s) and likely successor(s) over the lifecycle of each Water Sharing Plan.

scenarios reported in Table 1 are the most appropriate for the 2023-2024 LTAAEL compliance purposes.

The scenarios are based on the floodplain harvesting scenario models which have been documented and published on our website. There are two reports. The model build report describes the development of the river system model - its conceptualisation, construction and calibration. The scenario report describes how the model was used to assess the LTAAEL and current conditions as well as other scenarios required for the floodplain harvesting program. It should be noted that the Gwydir Regulated River Water Sharing Plan was amended on the 29th of July 2022 to include rules for floodplain harvesting. The floodplain harvesting licences have been fully operational since the 15th of August 2022; therefore, as of 2022-2023, they are an integral component of the current conditions.

The model scenarios used in the LTAAEL compliance assessment for 2023-2024 are based on the modelled scenarios documented in the two published reports referred to above and with those used in previous years. However, several significant amendments have been made this year. Along with the customary full refresh of input data, these amendments address errors identified in September-October 2024 during work on the Connectivity Project and the Sustainable Diversion Limit (SDL) compliance audit. The key amendments are as follows:

1. Inconsistency in modelling Copeton evaporation with dam inflow back-calculation.

Unfactored SILO synthetic pan evaporation (EvSp) was used to model Copeton Dam evaporation, while monthly factors were applied to the EvSp time series when back-calculating historical inflows into Copeton Dam, effectively overestimating Copeton Dam evaporation losses. This inconsistency affected all scenarios, and correcting it resulted in increased regulated diversions across all scenarios.

2. Representation of the low flow protection rule (3T). The flow data used to pre-process the irrigation share of 3T was incorrect. It was based on Sacramento data; however, it should have been updated to the FORS-simulated 3T inflow. Significant differences between the Sacramento and FORS daily inflow time series caused a corruption of modelling of the 3T rule, allocating a larger share of protected 3T flow than prescribed by the Water Sharing Plan for the Gwydir Regulated River Water Source. The following points should be noted:

- This issue primarily impacted the pre-1980 period, as post-1980 data relies on a reliable continuous record from the 3T gauges (418015, 418017, and 418025).
- It applies only to scenarios featuring the 3T rule, such as the WSP and current conditions.
- Recalculating the irrigation shares of each 3T component using FORS inflows corrected the error, resulting in higher river diversions in both scenarios.

3. **Configuration of floodplain harvesting accounting.** An error in the configuration of floodplain harvesting exemptions was identified. The current conditions scenario model was previously modified inadvertently, omitting the trigger that disables the exemption of floodplain harvesting from irrigable areas. As a result, floodplain harvesting from irrigable areas was always exempt. Correcting this error reduced floodplain harvesting and increased river diversions subject to Available Water Determinations (AWDs).
4. **Prioritisation of floodplain harvesting take over supplementary take.** This issue affected four floodplain harvesting properties with access to overbank flow harvesting from the main river, two of which hold significant supplementary water access licenses. The erroneous configuration prevented any supplementary take at these nodes. The following points should be noted:
 - Correcting the error significantly increased supplementary take but decreased floodplain harvesting.
 - The issue impacted all three scenarios central to the LTAAEL assessment.

The corrections above collectively resulted in increased regulated diversions across all scenarios and a trade-off between supplementary and floodplain harvesting under the WSP and current conditions scenarios. However, the relative differences between the three scenarios remained largely unaffected.

It is worth noting that, except for the first, these corrections are not considered in the 2023–2024 SDL compliance, as the Annual Permitted Take (APT) is based on the accredited model. The APT model workbook includes data showing how these corrections would affect the APT results, indicating only a very small (<0.5%) increase in total diversions, with no material impact on the outcomes.

Table 1 Scenario models selected for Gwydir Regulated River Water Source for LTAAEL assessment purposes

Scenario model	System file
Cap conditions	CAP_v27_11_2024-2a_3_final.sqq
WSP conditions	BDL_v27_11_2024-2a_3_final.sqq
Current conditions	VSC_v27_11_2024-2a_3.sqq

Note: The Cap and WSP 'final' versions of the model scenarios reflect a multistage iteration process required between the equivalent Barwon-Darling and Gwydir River system model scenarios.

LTAAEL compliance results

LTAAEL assessment

The LTAAEL is the modelled long-term average annual extractions calculated over the duration of the available climate record using either the Cap or the WSP scenario model, whichever is the lesser. For this assessment, the modelling period 1895-2024 was used. The results of this analysis are reported in Table 2.

The LTAAEL for the Gwydir Regulated River Water Source is 407.9 GL/y based on the amended water sharing plan scenario model. There are also unmodelled extractions estimated at 6.0 GL/y. These unmodelled estimates have not changed and are not included in LTAAEL compliance assessment.

The water sharing plan now includes all water take components such as plantation forestry and harvestable right dams, to harmonise with reporting required under the Basin Plan. In this regulated river water sharing plan area, the water source boundary is defined by the bank of the regulated river and hence plantation forestry and harvestable rights dams are located within the adjacent unregulated river water source. It is worth noting that while floodplain harvesting does not occur in the water source, the water sharing plan explicitly includes floodplain harvesting in connection with extractions from a regulated river in the LTAAEL and the use from the associated access licences is to be included in the compliance assessment.

Table 2 Modelled long term average annual extractions (1895-2024) for Cap and WSP scenario models (GL/y)

Extraction category	Cap scenario	Water Sharing Plan scenario
General and high security	217.6	213.4
Supplementary access	109.4	90.7
Local Water Utility	3.8	3.8
Floodplain harvesting	81.6	100.0
Total modelled extractions	412.4	407.9
Basic Rights (unmodelled estimates)	6.0	6.0

Water taken under a basic landholder right has also been excluded from the compliance assessment. This exclusion is due to any unmodelled estimates being omitted if no assessment of change has been made.

Finally, rainfall runoff exempt under the Water Management (General) Regulation 2018 (Clause 39B) has also been excluded from the compliance assessment. The exempt rainfall runoff volume is excluded from the definition of floodplain harvesting and from the definition of LTAAEL under the Water Sharing Plan dated 29 July 2022.

Compliance assessment

The modelled long-term average annual extractions from the current conditions model scenario are compared to the LTAAEL results in Table 3.

Table 3 Modelled long term average annual extractions (1895-2024) for LTAAEL and Current Conditions' scenario models (GL/y)

Extraction category	LTAAEL scenario	Current Conditions scenario
General and high security	213.4	218.9
Supplementary access	90.7	93.3
Local Water Utility	3.8	3.8
Floodplain harvesting	100.0	90.1
Total modelled extractions	407.9	406.1

The key difference between the LTAAEL and current scenario models' results is a 2.5% increase in river extractions due to a decrease in floodplain harvesting. The current conditions scenario has larger on-farm developments (e.g., pumping and storage capacity), however floodplain harvesting extractions are less than they are under the LTAAEL scenario due to the accounting framework. This reduction increases water demand from other sources but remains constrained by overall water availability, including Allowable Water Determinations (AWD) and supplementary flows.

The current water sharing plan specifies that there is non-compliance where:

- Current condition extractions exceed LTAAEL by 3% or more; or
- Current condition extractions exceed the average of CAP and LTAAEL; or
- Current condition extractions exceed the Cap.

The results show that current conditions extractions are:

- Smaller than LTAAEL extractions by 0.4%
- Smaller than average of CAP and LTAAEL by 1.0%
- Smaller than CAP by 1.5%.

The long-term average annual extractions in the Gwydir Regulated River Water Source were compliant in 2023–2024, as the criteria for non-compliance were not met.

No compliance action is required.

It should be noted that the assessment does not account for temporary water restrictions that were in place in 2022–2023. In that year, there was a reduction to the supplementary water access licence Available Water Determination (AWD). This reduction was an LTAAEL compliance action. This latest assessment is checking whether there is a return to compliance without the need for temporary water restrictions.

Previous Compliance actions

The NSW Government took compliance action in the 2021–2022 water year by reducing the available water determinations for supplementary water access licences in the Gwydir Regulated River Water Source to 0.5 ML/share to begin returning extractions to LTAAEL. A further compliance action of 0.21 ML/share was taken at the commencement of the 2022–2023 water year as the rules in the Water Sharing Plan for floodplain harvesting licensing had not commenced.

However, floodplain harvesting licenses have been fully operational in the Gwydir Regulated River Water Source since the 15th of August 2022. The rules for floodplain harvesting licenses are defined in amendments made to the Gwydir Regulated River Water Sharing Plan on the 29th of July 2022.

As in the previous years, there was a firm anticipation that the licenses would effectively restrict water taken through floodplain harvesting and align extractions with the LTAAEL. This anticipation enabled the lifting of the July 2022 compliance action. On the day the licensing framework commenced, the available water determination for supplementary water access licences was restored to 1.0 ML/share.

This year's assessment results confirmed these expectations, demonstrating that the Gwydir Regulated River Water Source has returned to compliance with LTAAEL. Furthermore, the model updates have brought the current level of diversions safely under the LTAAEL.

Supporting information

Results over Basin Plan assessment period

This year, we refreshed all climate data inputs for the entire long-term model simulation period. Additionally, we amended all model scenarios to address identified issues. Both the correction of model errors and the fully refreshed climate data adhere to the principle of utilising the best available models and data.

As described earlier in this document, these amendments resulted in an overall increase in river diversions (i.e., regulated and supplementary) across all scenarios and a slight decrease in floodplain harvesting diversions under the current conditions scenario. The changes lead to an increase in the total diversions for both the LTAAEL and the current conditions results. The increase for LTAAEL was slightly larger.

The updated results over the Basin Plan assessment period of 1895-2009 are presented in Table 4 and included for reference only. These results were also reported in last year's report and can be used to track significance of model updates. Table 4 shows that the current conditions average is 3.9 GL less than the LTAAEL. In last year's assessment it was 0.6 GL less than LTAAEL.

Table 4 Modelled long term average annual extractions (1895-2009) for LTAAEL scenario model and Current with floodplain harvesting licences scenario model (GL/y)

Extraction category	LTAAEL scenario	Current Conditions scenario
General and high security	217.0	222.8
Supplementary access	92.0	94.8
Local Water Utility	3.8	3.8
Floodplain harvesting	101.3	88.8
Total modelled extractions	414.1	410.2