



NSW Floodplain Harvesting Policy

NSW Border Rivers account management comparison

April 2021



Published by NSW Department of Planning, Industry and Environment

dpie.nsw.gov.au

Title: NSW Floodplain Harvesting Policy

First published: 28 April 2021

Department reference number: PUB21/238

© State of New South Wales through Department of Planning, Industry and Environment [2021]. You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose provided you attribute the Department of Planning, Industry and Environment as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication in advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (April 2021) and may not be accurate, current or complete. The State of New South Wales (including the NSW Department of Planning, Industry and Environment), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

Acknowledgment of Country

The Department of Planning, Industry and Environment acknowledges the Traditional Owners and Custodians of the land on which we live and work and pays respect to Elders past, present and future.

Contents

NSW Floodplain Harvesting Policy	0
List of Tables	ii
List of Figures	ii
A comparison of different account management rules in the Border Rivers	1
Assessment summary	1
Predicted environmental outcomes	1
Predicted hydrological outcomes	1
Predicted environmental outcomes	2
Appendix A: Background	3
Environmental assets and values on the floodplain	3
Quantifying changes to the floodplain hydrology	4
Estimating the environmental outcomes	4
References	4
Appendix B: Predicted % outcomes of annual vs 5-year accounting	5

List of Tables

Table 1 Modelled entitlement in the NSW Border Rivers under different account frameworks	1
Table 2 Modelled long-term average (1895–2009) total diversions	1
Table 3 Average percentage change in a subset of ecologically relevant flow metrics after implementation of the policy with: annual accounting (NC) and five-year accounting	1
Table 4 Average percentage change in frequency of achieving environmental water requirement metrics for native fish in the Border Rivers valley floodplain after implementing the policy with annual and 5-year accounting	2
Table 5 Average percentage change in frequency and timing of achieving environmental water requirement metrics for native vegetation in the Border Rivers valley floodplain after implementing the policy with two account management rules	2

List of Figures

Figure 1 Mapped summary of predicted native vegetation, native fish, mean annual volume and flow duration (total flow days) outcomes for the Border Rivers	1
Figure 2 Summary of the approach to identify the environmental outcomes of implementing the policy with and without the rainfall run-off exemption (FPH = floodplain harvesting; Source/IQQM are river system/hydrological models)	3

A comparison of different account management rules in the Border Rivers

This report uses the NSW Border Rivers as a case study to show whether a proposed five-year accounting provides better or worse outcomes than annual accounting for the environment.

The Department of Planning, Industry and Environment has proposed implementing 5-year accounting for floodplain harvesting licences under the NSW Floodplain Harvesting Policy. Some stakeholders have raised concerns that these rules may be detrimental to downstream and environmental outcomes.

This report provides an analysis of the predicted environmental outcomes associated with annual and 5-year accounting. **Note:** Annual accounting results in entitlements that are approximately three times larger than five-year 500% accounting.

Table 1 Modelled entitlement in the NSW Border Rivers under different account frameworks

Account framework	Entitlement issued (shares)
Annual	119,359
Five-year 500% account limit	43,000

Assessment summary

Analysis of the department's hydrological models using key hydrological metrics and water requirements for important native fish and vegetation values in the valley suggests that:

- both scenarios provide similar predicted hydrological and environmental outcomes with no **substantial differences**
- for **some of the metrics and locations** on the floodplain, five-year accounting is expected to provide better outcomes, while for other metrics and locations we expect better outcomes when the annual accounting rule is applied

Table 2 Modelled long-term average (1895–2009) total diversions

Parameter	Baseline diversion limit (GL/year)	Current conditions (GL/year)	Policy: 5-year 500% account limit (GL/year)	Policy: annual accounting (GL/year)
General and High Security	92.1	92.6	93.0	94.4
Supplementary	69.2	70.0	71.2	72.3
Floodplain harvesting + non-exempt rainfall harvesting	38.7	43.6	38.02	39.90
Total	200.0	206.1	202.21	206.60
Growth in floodplain harvesting from the baseline	-	3.1%	1.1%	3.3%

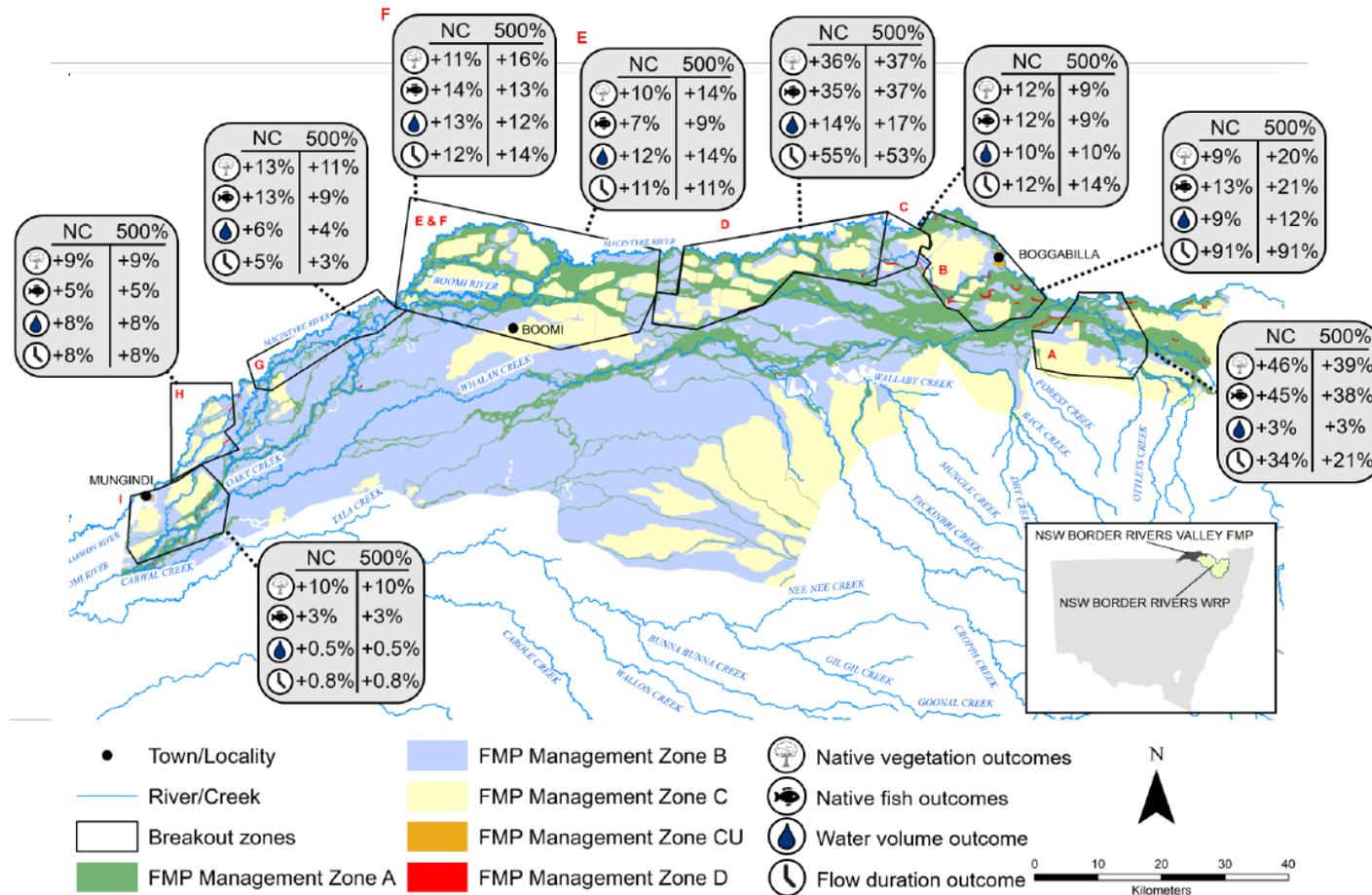


Figure 1 Mapped summary of predicted native vegetation, native fish, mean annual volume and flow duration (total flow days) outcomes for the Border Rivers

Percent change values show the predicted change from current (no policy) to current with policy implemented under two scenarios: annual accounting or no carryover (NC) and 5-year accounting or 500% account limit. Outcomes are based on a 124-year simulation period. Values for native vegetation and native fish outcomes are the average change in achieving key environmental water requirements at each breakout zone. **FMP** = Floodplain Management Plan.

Breakout zones from most upstream to most downstream: **A** Boonal, **B** Boggabilla, **C** Goondiwindi, **D** Whalan, **E** Tarpaulin (Copa/Whalan), **F** Terrewah, **G** Boomangera, **H** Yarrowee, **I** Boomi/Whalan

Predicted environmental outcomes

Floodplain harvesting – NSW Border Rivers account scenario comparison of annual and 5-year accounting.

Predicted hydrological outcomes

You can find a summary of the methods used in this report in Appendix A, with more details on the methods provided in the document referenced as DPIE Water 2020.

The predicted hydrological outcomes are as follows:

- Annual and 5-year accounting rules improve hydrology metrics.
- In general, there are only small modelled differences between annual and five-year accounting rules.
- Averaged across all metrics, the five-year accounting rule had +0.7% beneficial change that the annual accounting rule.
- There were slightly higher mean annual volumes and total spring and summer volumes for five-year accounting, with slightly higher event magnitudes for the annual accounting rule.
- The greatest difference between rules was seen for the mean inter-event period, with a +5% average change (76 flow days) for the 5-year accounting rule. This suggests that the period between events will be reduced further under five-year accounting, providing better hydrological and environmental outcomes.
- There was slightly higher total number of days with flow (1.8%, 4.8 days) and total summer flow days (4.2%, 1.9 days) for the annual accounting.

Table 3 Average percentage change in a subset of ecologically relevant flow metrics after implementation of the policy with: annual accounting (NC) and five-year accounting

Hydrological feature	Flow metric	Average value change* (Annual)	Average value change* (5-year)	Average % change (Annual)	Average % change (5-year)
Magnitude and timing	Mean annual volumes (ML)	2,799 ML	2,954 ML	8.1%	8.8%
Magnitude and timing	Total spring volumes (GL)	4.0 GL	9.4 GL	2.7%	3.9%
Magnitude and timing	Total summer volumes (GL)	47.0 GL	52.2 GL	10.0%	10.9%
Magnitude and timing	Median of event magnitude (ML/d)	14.8 ML/d	12.9 ML/d	4.7%	4.0%
Frequency	Number of events	3.6	3.2	10.4%	8.9%
Frequency	Mean inter-event period** (days)	-120 days	-196 days	-6.4%	-11.4%
Duration and timing	Total spring days with flow	7.3 days	10.4 days	4.4%	5.4%
Duration and timing	Total summer days with flow	39.7 days	37.8 days	29.6%	25.4%
Duration and timing	Total number of days with flow	98.6 days	93.8 days	25.8%	24.0%

*This report uses the final model build as reported in the model build report (DPIE-Water 2020).

** Negative percentage change is a good outcome for the value or asset as the mean period between floods (inter-event period) has reduced.

Predicted environmental outcomes

The predicted environmental outcomes for native fish are as follows:

- Both rules provide improved overall outcomes for duration, frequency and timing metrics for both short- to moderate-lived floodplain specialists and flow-dependent specialists.
- There are only small differences between annual and 5-year accounting for each metric.
- On average, we predict the annual accounting rule to be only +0.1% higher than the 5-year accounting rule for all metrics and fish guilds.

Table 4 Average percentage change in frequency of achieving environmental water requirement metrics for native fish in the Border Rivers valley floodplain after implementing the policy with annual and 5-year accounting

Fish type	Duration (NC)	Duration (500%)	Frequency (NC)	Frequency (500%)	Timing (NC)	Timing (500%)
Short- to moderate-lived floodplain specialist	17.5%	18.0%	18.0%	18.5%	11.0%	10.5%
Flow-dependent specialist	17.5%	16.5%	18.0%	18.0%	18.0%	17.5%

Table notes: Values represent average predicted outcomes over the simulation period across the nine breakout zones.

The predicted environmental outcomes for native vegetation are as follows:

- Both account management rules provide similar outcomes for native vegetation.
- While the differences between the account management rules are small, the 5-year accounting rule provides slightly better outcomes for native vegetation.
- The greatest predicted difference was for the timing metric for Lignum, with the 5-year accounting rule predicted to be +3% higher than the annual accounting rule.

Table 5 Average percentage change in frequency and timing of achieving environmental water requirement metrics for native vegetation in the Border Rivers valley floodplain after implementing the policy with two account management rules

Vegetation type	Frequency (Annual)	Frequency (5-year)	Timing (NC) (Annual)	Timing (500%) (5-year)
Lignum	16.0%	18.0%	17.5%	20.5%
Coolabah	16.5%	17.5%	10.5%	9.5%
River red gum	25.0%	26.0%	10.5%	9.5%
River cooba	17.0%	17.0%	N/A	N/A
Water couch	40.0%	41.0%	10.5%	9.5%

Table notes: Values represent average predicted outcomes over the simulation period across the nine breakout zones.

Appendix A: Background

The department has already undertaken a detailed assessment of the environmental outcomes of implementing the Floodplain Harvesting Policy in the Border Rivers valley (DPIE 2020). This analysis uses the same methods to identify the impact of the 5-year versus the annual accounting rules.

There are three main components of the approach. These are shown in Figure 2 and described in the sections following.

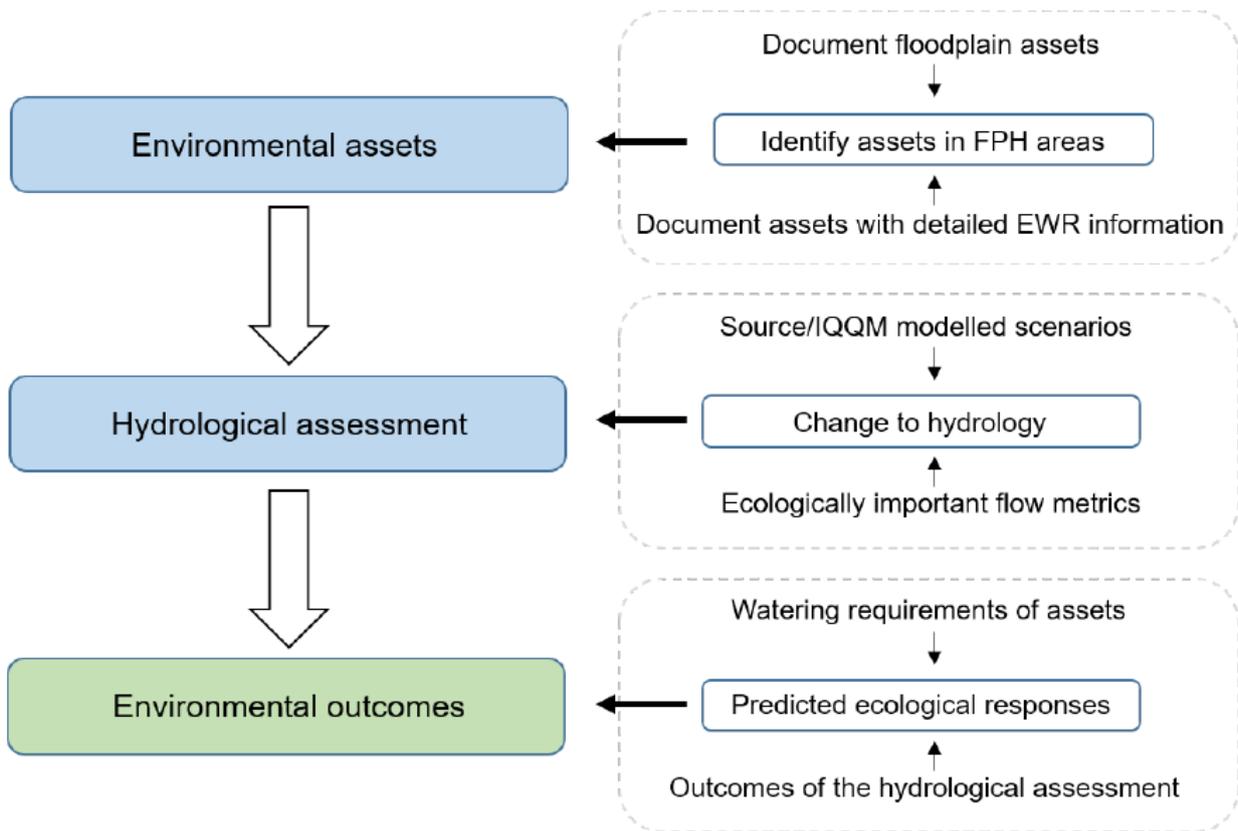


Figure 2 Summary of the approach to identify the environmental outcomes of implementing the policy with and without the rainfall run-off exemption (FPH = floodplain harvesting; Source/IQQM are river system/hydrological models).

Environmental assets and values on the floodplain

The Border Rivers valley floodplain is characterised by wetland and lagoon complexes that support an array of water-dependent environmental assets (e.g. locations) and values (e.g. species). The assets and values used for this assessment were:

- **native fish**, which are grouped into 'flow-dependent' and 'short to moderate' specialist guilds for this report
- **native vegetation**, specifically lignum, coolabah, river cooba, river red gum and water couch.

You can find a full list of known environmental values in the document referenced as DPIE Water 2020.

Quantifying changes to the floodplain hydrology

Magnitude, frequency, duration and timing are all ecologically important hydrological features of the floodplain flow regime. We selected flow metrics that describe the change to flood magnitude (e.g. volume), frequency, duration and timing. These are described in more detail in the document referenced as DPIE Water 2020.

Estimating the environmental outcomes

The predicted ecological responses to changes in floodplain hydrology provide an assessment of the potential environmental outcomes. We analysed the ecological responses of two key native fish guilds and several vegetation species for this assessment.

The duration, frequency and timing of events needed for maintenance and regeneration/reproductive outcomes as well as other relevant metrics are detailed in Appendix C of the environmental outcomes report referenced as DPIE Water 2020. This report summarises the average outcome for a number of environmental water requirement metrics to provide a high-level summary of the predicted environmental outcomes (Table 3 and Table 4).

References

DPIE Water 2020 Environmental outcomes of implementing the Floodplain Harvesting Policy in the Border Rivers Valley, PUB20/883. NSW Department of Planning, Industry and Environment

DPIE Water 2020 Border Rivers model build report: Conceptualising, constructing and calibrating the DPIE Water Border Rivers hydrological model. Department of Planning, Industry and Environment - Water, Sydney NSW, Australia

Appendix B: Predicted % outcomes of annual vs 5-year accounting

Zone	Location	Asset	Annual	5-year (500%)
A	East of Boggabilla	Native vegetation	+46%	+39%
		Native fish	+45%	+38%
		Water volume outcome	+3%	+3%
		Flow duration outcome	+34%	+21%
B	Boggabilla area	Native vegetation	+9%	+20%
		Native fish	+13%	+21%
		Water volume outcome	+9%	+12%
		Flow duration outcome	+91%	+91%
C	West of Boggabilla	Native vegetation	+12%	+9%
		Native fish	+12%	+9%
		Water volume outcome	+10%	+10%
		Flow duration outcome	+12%	+14%
D	Boggabilla to Boomi	Native vegetation	+36%	+37%
		Native fish	+35%	+37%
		Water volume outcome	+14%	+17%
		Flow duration outcome	+55%	+53%
E	East of Boomi	Native vegetation	+10%	+14%
		Native fish	+7%	+9%
		Water volume outcome	+12%	+14%
		Flow duration outcome	+11%	+11%
F	West of Boomi	Native vegetation	+11%	+16%
		Native fish	+14%	+13%
		Water volume outcome	+13%	+12%
		Flow duration outcome	+12%	+14%
G	Boomi to Mungindi	Native vegetation	+13%	+11%
		Native fish	+13%	+9%
		Water volume outcome	+6%	+4%
		Flow duration outcome	+5%	+3%
H	North east of Mungindi	Native vegetation	+9%	+9%
		Native fish	+5%	+5%
		Water volume outcome	+8%	+8%
		Flow duration outcome	+8%	+8%
I	Mungindi	Native vegetation	+10%	+10%
		Native fish	+3%	+5%
		Water volume outcome	+0.5%	+0.5%
		Flow duration outcome	+0.8%	+0.8%

© State of New South Wales through Department of Planning, Industry and Environment 2021. The information contained in this publication is based on knowledge and understanding at the time of writing (April 2021). However, because of advances in knowledge, users should ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate departmental officer or the user's independent adviser.