Submission No 65

INQUIRY INTO FLOODPLAIN HARVESTING

Organisation: Gwydir Valley Irrigators Association (GVIA)

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GVIA

Gwydir Valley Irrigators Association Inc.

Submission to: NSW Legislative Council Select Committee

"Inquiry into Floodplain Harvesting"

By:

Gwydir Valley Irrigators Association Inc

13 August 2021

making every drop count

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1 Summary and Purpose

This document has been developed by the Gwydir Valley Irrigators Association (GVIA) on behalf of its members as a formal submission for consideration by the NSW Legislative Council Select Committee Inquiry into Floodplain Harvesting.

This document aims to represent the concerns, views and experiences of our members, not as individuals but as a local industry. Each member reserves the right to express their own opinion and is entitled to make their own submission.

Every member of the GVIA is also a member of the NSW Irrigators Council and as such we endorse their submission unless clearly outlined otherwise.

2 Introduction

The Gwydir Valley Irrigators Association (GVIA) is the representative body for irrigation entitlement holders in the Gwydir Valley.

In the early 2000's, during the development of the first Water Sharing Plan for the Gwydir Regulated River Water Source, the NSW Government at the time realised that they could not achieve full transition of all water licences to the Water Management Act framework. They instead provided a commitment to a "*separate category of licence*" and the "*management of floodplain harvesting will occur on a state-wide basis*" via a list of key principles in Appendix 3 of the Water sharing Plan, stating:

"Floodplain harvesting can no longer be left outside of the State's water management and compliance system or as a source of increase in further water extractions. Given this, it is the Government's intention that floodplain harvesting works and taking of water from floodplains be licensed and managed. It will take a number of years to complete the process. However, the water sharing plans must signal the basic principles that will govern the process."[1]

In 2021, 20-years later there still remains no regulatory framework to enable the licensing and management of this form of take, in NSW. Even though back 2000, it was clearly accepted that the form of take could no longer be left outside the State's water management and compliance system.

As we wrote as recently as March 2021 during consultation on the proposed rules for the Water Sharing Plans for the Gwydir Regulated and Unregulated Water Sources[2], it is unacceptable that this form of take remains outside the contemporary framework. Any discussion or consultation about valley-specific rules remains academic until there is commitment to support a regulatory framework to achieve the outcome of licencing, metering and reporting of floodplain harvesting and overland flows in NSW.

The finalisation of licencing of floodplain harvesting cannot be delayed any longer, 20-years is enough.

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[1] Historical version of the Water Sharing Plan for the Gwydir Regulated River Water Source https://legislation.nsw.gov.au/view/html/inforce/2015-10-16/sl-2015-0629#sch.3-sec.Section_3

[2] GVIA Submission Water Sharing Plan rules for floodplain harvesting in March 2021.

The outcomes of the Healthy Floodplains project for the Gwydir region should be reason enough to reaffirm this commitment with 30% of the long-term water take outside of the current, contemporary licencing framework.

The establishment of volumetric licences within the Water Management Act 2000 for floodplain harvesting does not create new water but rather, is recognising this existing historical form of access in the current regulatory framework. As reflected by the initial principles back in the 2000's.

Key regulations consulted on at the end of 2020, were put to NSW Parliament in April 2021 to enable this transition to occur. These included:

1. Water Management (General) Amendment (Floodplain Harvesting) Regulation 2021.
2. Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2021.
3. Water Management (General) Amendment (Exemption for Rainfall Run-off Collection) Regulation 2021).

These were subsequently disallowed in May 2021.

As we clearly warned at the time, without enabling the licencing framework and then implementing valley-based compliance through water sharing plan rules, this form of take remains unmanaged, unmeasured and unaccounted. The disallowance means that the benefits and outcomes of licensing in our valley, as presented here, are further delayed and put on hold.

This is not in the interests of any stakeholder. An analysis of stakeholder views presented in Attachment A, highlights there is strong commitment to licencing across a broad spectrum of interests but that other water management issues are being conflated as part of the debate. The focus must remain on moving forward with improving the regulation of floodplain harvesting.

Issues with how NSW manage water during extreme droughts, cannot be addressed through flood policy. The utilisation of floodplain harvesting, which occurs in a flood, must be separated from the debate about preparing for and managing flows in drought.

WHAT LICENSING MEANS IN THE GWYDIR VALLEY

Licensing proposal in May 2021, was for valley-wide unit shares for floodplain harvesting of **108,000 unit shares** which are by design, **21.5% lower** than the current long-term current take volumes[1] and a **27% reduction in the maximum volume** to be accessed during a flood, from the current conditions (See Table 3).

This will lead to a **13% increase in mean annual flood volumes** across the floodplain in years when floods occur.

The internationally important **Gwydir Wetlands** is expected to receive the greatest benefits. Modelled environmental water requirements of native vegetation, native fish and waterbirds in this zone would be met more often, by an average of 82%, 97% and 142% respectively.

Intangible benefits for industry and communities is **certainty** and **confidence**, that everyone who relies on floodplain flows can receive their fair share, no more, no less. Without licensing, mistrust and misinformation thrives.

It is important to understand that valley-connectivity and river flow outcomes have occurred historically with floodplain harvesting in place. Often the years when the Gwydir and the Northern Basin have floodplain harvesting opportunity correlate with the years when good contributions occur to downstream and Menindee Lakes fill-up. That is because floodplain harvesting take is a small portion of total flows available at a time.

However, drought management is an important issue. But this is a different discussion than how to licence floodplain harvesting and must be part of a larger policy discussion about water sharing options in extreme droughts into the future. This discussion can only benefit from having floodplain harvesting licenced, managed, and metered which isn't currently the case. We believe that having actual measurement data about floodplain take is essential for stakeholders confidence.

Perhaps the barrier to implementation is more about timing; should the licensing program be delayed further to allow the collection of measurement data or drought management rules, or, should limits on take be enabled with measurement, concurrently to processes to incorporate any new data or information when it becomes available. With either option, its important to remember that this form of take will remain unmanaged, unmeasured and unaccounted until such time NSW Parliament enables it to be.

Acknowledging that models can improve and that as a result, outcomes of scenarios and possibly limits defined by these scenarios can change, is imperative to accepting the outcomes of the Healthy Floodplains Project.

Licencing any historical form of take is not without its challenges, as water users, will be subjected to further regulation, reduced water and increased costs. We estimate that licencing floodplain harvesting, and overland flows will have on average a $93M economic impact to our community. But as water users, we recognise the importance of remaining compliant to legal limits and compliance is one of the many reasons we have long supported this process.

Legal limits must be recognised. If exceeded, they should also be managed within the category of use that create that growth. But decisions on how to achieve these limits must consider the socio-economic impacts on those communities, to ensure our transition to new rules does not inflict sudden, irreversible economic hardship. Because of this it is imperative that a trading framework is established, allowing available water to move to where it is valued most. This will allow individuals to return to their historical access levels or new opportunities, to ensure efficient use of our limited water resources, which may help to mitigate a future with less water.

This submission represents the second Inquiry of such nature by the NSW Legislative Council in the last 12-months but conservatively, the twentieth submission on Floodplain Harvesting over the last 10-years by our organisation. This has included:

- NSW Legislative Council Select Committee into Floodplain Harvesting (this submission).
- Submission into the Statutory Review of the Floodplain Management Plan for the Gwydir Valley (2021).
- Consultation into changes to Water Sharing Plan for the Gwydir Regulated River and Gwydir Unregulated Water Sources (2021).

- Consultation into proposed Water Management Amendment Regulations for Floodplain Harvesting Licences, Measurement and Rainfall Runoff (2020).
- Consultation into changes to the Water Sharing Plan for the NSW Border Rivers Water Sources (2020).
- Submission into the Independent Panel into the Management of the Northern Basin First Flush (2020).
- NSW Legislative Council Regulation Committee into Floodplain Harvesting Exemption Regulation and hearing (2020).
- Submissions into proposed Water Resource Plan for the Gwydir Surface Water Sources and Submissions into the review of the Water Sharing Plan in the Gwydir Regulated River (2013, 2014, 2016, 2018, 2019 and 2020).
- Joint submission with Northern valleys into the Floodplain Measurement Monitoring and Audit Policy (2019).
- Submission into the Independent Review of NSW Floodplain Harvesting Policy Implementation (2018).
- Submission into Water Reform Action Plan – Healthy Floodplain Policy (2018).
- Joint Submission into the draft Floodplain Harvesting Measurement policy (2017).
- Submission to DPIW draft Entitlements (2017).
- Submission into the Floodplain Management Plan for the Gwydir Valley (2014).
- Submission into the Gwydir Unregulated Water Sharing Plan (2011).
- Submission into draft Floodplain Harvesting Policy (2010).

This list excludes the variety of discussion papers prepared to enable conversations and solutions, to some of the complex issues that have arisen over the protracted implementation of this policy. It also excludes the earlier submissions and discussions on the policy dating back to the initial water sharing plan preparation in the early 2000's and the first policy iterations in 2002 and 2008.

We have engaged in good faith throughout these processes over the last 20-years, in the interests of securing certainty for our industry and our community that relies on floodplain flows. We have made this commitment despite knowing it is at the detriment to our current levels of water availability, because we recognise and advocate for a sustainable future for our industry, our local environment, and our communities. We are not asking for this at the expense of others, just to recognise our fair share, as they too, should also be allowed.

We have done our role.

It is now up to the NSW Parliament to do what was committed back in 2000 and enable a framework that can licence, meter, and manage floodplain harvesting state-wide in NSW.

We offer the following recommendations to assist with this outcome.

2.1.1 Recommendations

We recommend that the Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2021 is revised, if a pathway to licensing cannot be secured as soon as practically possible. This is proposed as an interim measure to adapt the regulation to allow a pathway to capture actual floodplain harvesting data in NSW as soon as practically possible and provide a pathway for unregulated users, to appropriately measure the capture of overland flow as part of their existing licence.

We recommend these three regulations published on April 2021:

1. Water Management (General) Amendment (Floodplain Harvesting) Regulation 2021.
2. Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2021.
3. Water Management (General) Amendment (Exemption for Rainfall Run-off Collection) Regulation 2021).

   are considered fit for purpose to enable the licencing, measurement and accounting of floodplain harvesting take in NSW as soon as practically possible.

We recommend a concurrent work program is established to address critical drought management concerns via a rules-based sharing arrangement agreed by all stakeholders to provide the greatest transparency and certainty, taking away the need to rely on temporary restriction mechanisms.

2.2 What we do

The GVIA's mission is to build a secure future for our members, the environment and the broader Gwydir Valley community through irrigated agriculture, we can do this together by making every drop count in the river or the aquifer, on-farm, for the environment, or for our community[3].

GVIA members hold entitlements within the Gwydir regulated and un-regulated surface water areas, in addition to groundwater resources. All of which are managed through water sharing plans, which have been progressively developed since early 2000.

The GVIA organisation is voluntary, funded by a nominal levy, cents/megalitre on regulated, unregulated and groundwater irrigation entitlement. In 2020-21 the levy was paid and supported by more than 86% of the eligible entitlement (excludes entitlement held by the NSW and Commonwealth governments).

Much of the activity of the association revolves around negotiating with government at a Federal, State and Local level to ensure the rights of irrigators are maintained and respected. While the core activities of the Association are funded entirely through the voluntary levy, the Association does also undertake programs to maintain and improve the sustainability of members on-farm activities which can be funded by government or research corporations.

The Association is managed by a committee of a minimum 11 irrigators and employs a full-time executive officer and a part-time administrative assistant, as well as hosting a Project Officer funded through the Cotton Research and Development Corporation, the Gwydir Valley Cotton Growers Association and the GVIA.

The GVIA and its members, are members of both the National Irrigators Council and the NSW Irrigators Council.

[3] For more information, see our corporate video on https://vimeo.com/177148006

2.3 Contacts

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3 The Gwydir Valley

3.1 Our Community

The Gwydir Valley Irrigators Association (GVIA) represents more than 450 water entitlement holders in the Gwydir Valley, centred around the town of Moree in North-West New South Wales.

The Moree Plains Shire region alone is highly dependent on agriculture and irrigated agriculture for economic activity contributing over 72% of the value of gross domestic product (cotton is around 60%), employing 20-30% of the population and accounting for almost 90% of exports from the Shire[4].

The 2011 agricultural census estimates that the total value of agricultural commodities for the Moree Plains Shire region was $911,951,079 up from $527,744,851 in the 2005-06 census. This is an estimated 7.83% of NSW's total agricultural production from a 1,040,021Ha principally used for agricultural crops[5].

3.2 Our region's water availability and use

Copeton Dam is a 1,300 gigalitres headwater storage capturing 45% of the Gwydir Valley's inflows. The dam accounts for dam losses, essential supplies including town water supplies, high security and stock and domestic water, an environmental contingency allowance and general security entitlements and the delivery of those entitlements which are allocated in that order of priority.

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[4] Cotton Catchment Communities CRC Communities and People Series 2009

[5] 2010 2011 Agricultural Census Report – agdata cubes, 71210D0005-201011 Agricultural Commodities, Australia

Water Sharing Plan rules reserve approximately 7% capacity for essential supplies including high security water which is secured for 2-years in advance. Essential supplies usage is between 1-2% total water use annually and has never not been delivered, although its delivery has been limited to specific bulk releases to manage losses as was undertaken in 2019-20. Any changes to either the reserve or the usage patterns of this water, directly impacts the lower priority water users including the Environmental Contingency Allowance, which make up the vast majority of shares to water in Copeton Dam.

The Gwydir is characterised as having low water reliability with most water held as general security water with a reliability of 36% (that means irrigators could expect in the long-term just over a third of their entitlement can be accessed). Supplementary water entitlement is somewhat more reliable with 55% but accounts for less than a quarter of the total volume. Groundwater reliability is considered 100% but there is less than 30,000ML available.

The triggering of supplementary sharing rules which are any flows downstream of Copeton Dam up to 500 megalitres per day, are designed to protect base-flows for the river and the wetlands, with any flows above the minimum threshold shared 50:50 with the environment. These rules provide natural connectivity of water sources within our region and downstream, when inflows occur. Changes to the Water Sharing Plan proposed as part of Water Resource Plan development allow environmental water managers more authority over where the 50% share of any flow maybe delivered, providing more scope for additional environmental benefit. This is currently being utilised to divert water above the minimum flow into the Gwydir Wetlands, into the effluents and tributaries which is providing additional downstream connectivity.

Our region's irrigators recognise the historical access to overland flows as a function of the natural hydrology of the valley. This is an irregular but important source of water for the industry accounting for up to a third of the long-term water used by the industry. This source of water is only available when our rivers and creeks, and/or floodplains are full beyond their capacity and spilling.

The total volume of water available to be accessed by irrigators has been reduced significantly over time due to reforms as outlined below in Table 1: Summary of Water Reform. Entitlements owned for environmental purposes totals more than 186,000 megalitres, which includes an Environmental Contingency Allowance (ECA) of 45,000 megalitres. The NSW and Commonwealth environmental water managers are now responsible for 28.5% of high security entitlement, 29% of general security entitlement and 13% of supplementary entitlement for environmental use. Environmental water was held in the Gwydir prior to the first water Sharing Plan. Environmental water is primarily used to contribute waterbird and fish breeding events and to maintain the condition and extent of the internationally recognised Gwydir Wetlands but as the portfolio has grown, so has the application and use of environmental water.

Table 1: Summary of Water Reform

Year	Program	Volume of entitlement
1970	Creation of replenishment flow	5,000ML
1995	Murray-Darling Basin 1993/94 Interim Cap established to limit future growth in access	
1996	Voluntarily reduced their general security reliability by 5%, by establishing the original Gwydir Valley Environmental Contingency Allowance (ECA) of general security equivalent water.	25,000ML General Security
2004	Gwydir Regulated River Water Sharing Plan further reduced reliability by 4%, primarily through increasing the ECA and enhancing its use and storage provision. Rules created for the WSP also reduced access, particularly to supplementary flow previously known as high flow.	20,000ML General Security
2006	Lower Gwydir Groundwater Source Water Sharing Plan reduced groundwater entitlements from 68,000 megalitres to 28,700 megalitres.	39,300ML Groundwater
2008 +	NSW State Government has purchased general security entitlement as well as supplementary for wetlands recovery programme.	17,092ML General Security 3,141ML Supplementary
	NSW Government infrastructure works	1,249ML High Security
	Commonwealth buy-back program.	88,133ML General Security 20,451ML Supplementary
2016	Commonwealth infrastructure programs.	4,508ML High Security 1,392ML General Security
TOTALS		5,757 High Security 156,617ML General Security (including ECA) 23,592 ML Supplementary

As a result, only approximately 24% of the total river flows are available for diversion for productive use this is consistent with the average for the northern basin being 21% of total inflows[6]. This equates irrigators holding 575,000 unit shares from regulated entitlement (high security, general security and supplementary water) and 28,000 unit shares available from groundwater aquifers. The DPIEW as part of the Healthy Floodplains Project consider 108,000 unit shares of overland flow is also utilised by water users in the valley.

[6] Based on IQQM long-term modelling, inflow analysis and the volume of water purchased for the environment

The main broad acre irrigated crop is cotton with irrigated wheat, barley and Lucerne also occurring depending on commodity prices. The total broad acre irrigated area is approximately 90,000 ha (although recent analysis indicate that maximum planting area is now 70,000ha) which is rarely cropped in one year. In 2010-11 census data indicated the total production value of irrigated cotton was $623M and is estimated to be worth three times that to the local community using the Cotton Catchment Communities Research Corporation economic multiplier for cotton regions[7]. For more information on the long-term production trends of cotton in the region visit the Gwydir Cotton Growers website[8].

Currently there are also pecans, walnuts, oranges and olives being grown within the region covering approximately 1,500 hectares and generating an estimated $31M with considerable benefits to the local community as a high intensity, permanent crop. There is significant potential for expansion into horticulture and improvement in water utilisation but the area of expansion it limited by the availability of high security water.

Changes in water availability either through climate or government policy has a direct impact on the productivity of the region as well as on the local economy. Analysis by the Murray Darling Basin Authority highlighted this relationship during the northern review and revealed that for both Moree and Collarenebri social and economic indicators declined through 2001 to 2011 including education, economic resources and disadvantage, resulting in an estimated 200 jobs lost due to the implementation of the Basin Plan in the region.

3.3 Our region's hydrology and geomorphology

The Gwydir River is an inland terminal river network that is also classified as "distributary" network by the Murray Darling Basin Commission under water sharing plan development. This indicates that the rivers become a series of branching channels that distribute their flows across large areas especially during flood times. This distribution of water represents the watercourse areas of which the Gwydir has internationally recognised Gwydir Wetlands. There are four parcels of land within the Gwydir Wetlands that are listed under the Ramsar Convention on Wetlands.

This natural geomorphology means the Gwydir River under natural conditions would have a very low ability to contribute to surrounding catchment inflows. The State of The Darling Interim Hydrology report puts the average percentage flow of the Darling River from the Gwydir River to be 12%, although updated estimates have this percentage between 8- 7% as reported in the Independent Assessment of the 2018-19 Fish Deaths in the Lower Darling. The low contribution, which is consistent with other terminal wetland systems, is a result of most of the water within the system flowing towards the terminal wetlands and watercourse.

While the natural hydrology has been altered via modification of the river and operations with an increase in end-of-system connectivity since irrigation development. Flows are now "*regulated down the Mehi, Moomin and Carole, which [can] join up with the Barwon River*"[9].

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[7] Social and Economic Analysis of the Moree Community, 2009. Cotton Catchment Communities CRC

[8] www.gwydircotton.com.au

[9] State of The Darling Interim Hydrology report, MDBC 2007

This channelization and re-regulation occurred throughout the last century to initially deliver regular stock and domestic water supplies to users and then to deliver irrigation water more efficiently. However, even with these modifications there remains limited capacity to securely move water through these systems with channel constraints limiting the daily flows. That's largely due to in-river flows being highly constrained by river channel limitations which are below 1000 megalitres per day on the Mehi constrained upstream at Bronte and 300 megalitres per day on the Gil Gil creek, these are the two main regulated systems that contribute to the Barwon River.

The relative contribution of the Gwydir is rather low, and the contribution is highly variable from year to year. For example, in 2016-2017 255,000 megalitres[10] flowed into the Barwon following a spring cyclonic event causing moderate flooding in the mid-catchment but the following year 2017-2018 the contribution was 29,000 megalitres predominately because of environmental water[11]. Generally, the contribution occurs largely due to significant flood events such as in 2011-2012 or recently, in March 2021 but sometimes extended in-river flows such as those in 2016-2017 provide for on-going connectivity.. These years where good contributions from the Gwydir occur, correspond with overland flow opportunity in the region as well, indicating that floodplain harvesting and downstream connectivity are not mutually exclusive of each other as often suggested. This is explored further below.

3.4 Historical Flooding

The Gwydir Valley has a history of flooding that brings both devastation and life to the region. While every flood is different in magnitude, duration and size they can be compared to help be prepared and predict possible behaviours.

Below is a key comparison of the big floods and these are generally ones that are regarded as key flood events for the region. The more recent floods are detailed later below. When a flood warning is issued, we often compare predicted heights to these key events which are largely reported by the Bureau of Meteorology in meters to provide warning for Moree residents in particular.

Table 2: Flood peak heights (m) and gauge location in the Gwydir Valley (Source: Gwydir FMP background[12] and Realtime data).

	Gwydir at Gravesend (m)	Gwydir at Pally (m)	Gwydir at Yarraman (m)	Mehi at Moree (m)
1955	17.34	-	-	-
1971	15.54	-	-	-
1974	15.46	-	-	-
1976	16.02	9.237	7.5	10.59
1984	14.14	-	-	-

[10] End of system calculations from Water Balance Reporting by NSW Government

[11] Independent Assessment of the Lower Darling Fish Deaths

[12] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0018/146052/gwydir-fmp-background-document.pdf

	Gwydir at Gravesend (m)	Gwydir at Pally (m)	Gwydir at Yarraman (m)	Mehi at Moree (m)
1998	12.87	-	-	-
2000	11.20	-	-	-
2004	13.67	-	-	-
2011	13.266	10.105	7.326	10.206
2012	15.88	10.518	7.512	10.68
2016	8.739	7.668	6.95	4.172
2021	14.9	10.5	7.35	10.43

The 2020 Northern Basin First Flush event is not included on this table because that flood was localised to the southern floodplain, south-west or Moree and the relevant gauges for managing flood risk were not impacted. Although this event was summarised in our submission into the Independent Assessment into the Northern Basin First Flush[13].

Past flood analysis demonstrates how floodplains can operate and how supplementary flow rules work. These past flood analyses, also explains why floodplain harvesting have negligible impact to downstream flows for either, irrigators or the environment as when valley-wide floodplain harvesting opportunity is available, Menindee Lakes fills or near fills, subsequently just after. Its just that These river flows may take a few months to arrive as explained in Figure 1: Localised flooding Menindee Lakes (Source: Barrier Daily Truth, 18.02.2012) at key downstream locations such as Menindee Lakes.

Figure 1: Localised flooding Menindee Lakes (Source: Barrier Daily Truth, 18.02.2012)

Have river, will flood

Saturday, 18th February, 2012

GOING UNDER: Doug Spencer on his property which has been filling up with water for the past fortnight. The tree on the left of the picture is normally "28 steps" from the river, he says.

It will be another three or four weeks before more floodwaters come down to Menindee but some townsfolk are already moving out.

Broken Hill locals, Doug and Chicky Spencer, have a Menindee home right beside the Darling River. Yesterday they moved the last of their belongings to higher ground as the last part of their block filled with water.

Mr Spencer said it had been "creeping in for a fortnight" and was about 35 centimetres deep.

The couple will go to Sunset Strip for the weekend before coming back to the Broken Hill to sit it out.

The below figures (Figure 2, Figure 3, Figure 4) illustrate inflows and outflows from the Menindee Lakes in the last 10-years, which match up to many of key floods in the Gwydir Valley. While the floodwaters from the Gwydir may take time to progress through the Gwydir Wetlands or across the Gwydir floodplain during these times our rivers are full and flowing, providing connectivity right along our systems. It is important to understand that these connectivity and flow outcomes have occurred historically with floodplain harvesting in place. That is because floodplain harvesting take is a small portion of total flows available at a time.

[13] GVIA Submission into the Independent Assessment into the Northern Basin First Flush https://www.gvia.org.au/water-policy/inquiries-and-submissions/recent-submissions/

This is supported by downstream outcomes modelling indicates if you removed floodplain harvesting from the northern basin entirely you would not impact Lower Darling or southern allocations by any more than 2%.

Figure 2: Menindee Lakes false colour image from May 2012 – with blue and green, showing extent of flooding. Source Geosciences Australia (https://www.youtube.com/watch?v=5n4Cc0Vwa7s)

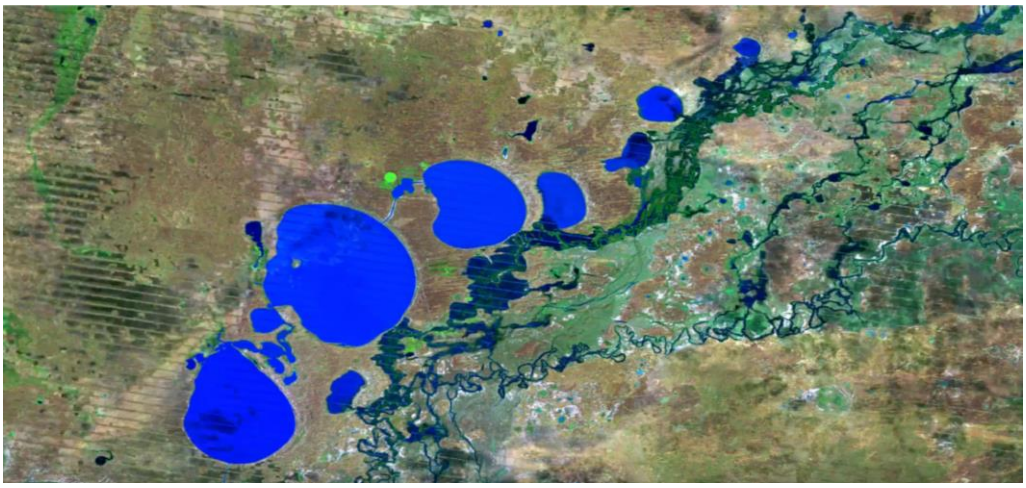


Figure 3: Menindee Lakes 10-year Cumulative Inflows. Source: WaterInsights.

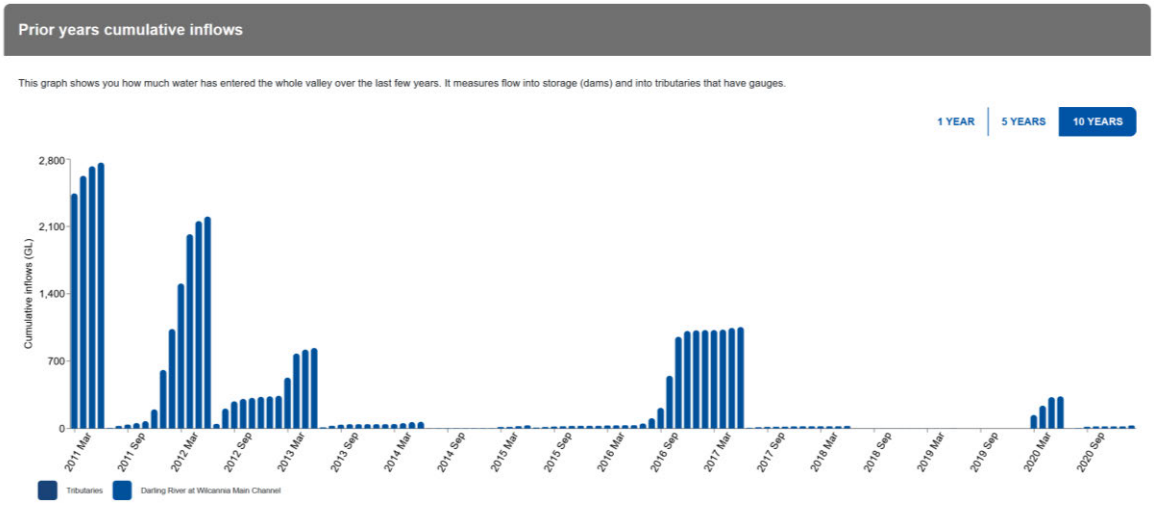
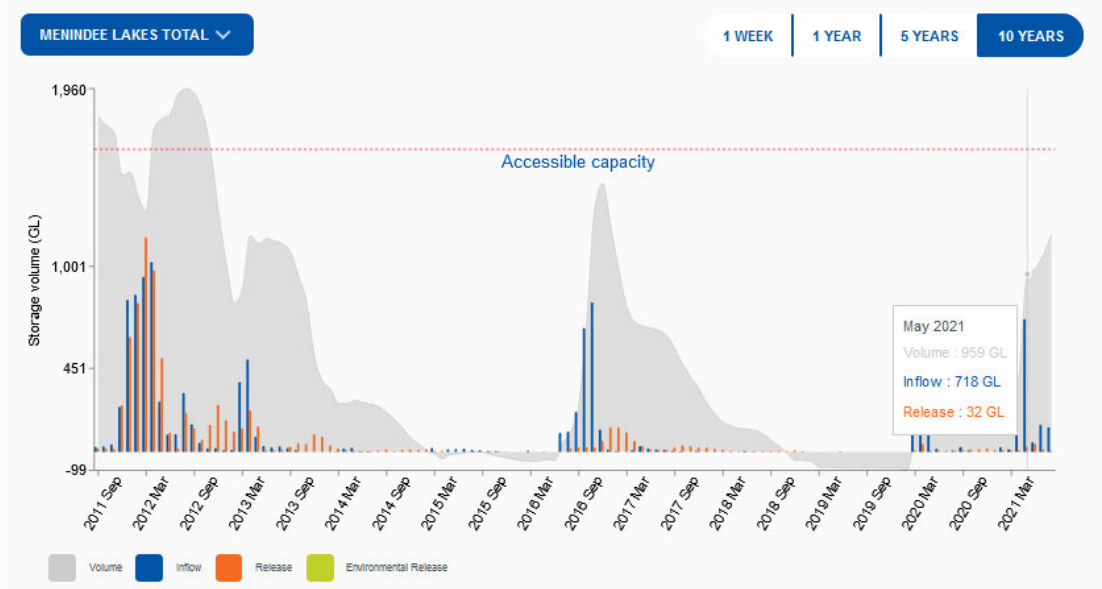


Figure 4: Menindee Lakes 10-year Storage Behaviour, Inflows and Outflows. Source: WaterInsights



3.4.1 1955

The flood in 1955 is regarded as the largest flood in living memory and is the benchmark for most floods for the region. This was prior to the construction of Copeton Dam.

This flood is a 1% Annual Exceedance Probability (AEP) or a 1 in a 100 year flood event[12]. A 1% AEP flood is a flood that has a 1% chance of occurring, or being exceeded, in any one year.

3.4.2 1976

Prior to the 2012 flood, the flood in 1976 is just following the first stage construction of Copeton Dam and is considered the design flood for rural floodplain management in the region.

This flood is considered a 3% AEP measured at Gravesend which is a 1 in a 33 year flood for the region. Most inflows were from the upper catchment and the flood heights downstream at Pallamallawa, equate to a 1 in 10 year-flood likelihood.

3.4.3 2011 and 2012

The 2011 and 2012 floods were part of wide-spread significant and extended flooding in the north-west. The flood at Gravesend in 2011 which occurred in November and December of 2011 was considered a 8% AEP or a 1 in 12-year flood likelihood.

Whereas the flood in 2012 in January and February was a 4% AEP or a 1 in 25 year flood. During this flood, most of the downstream key locations in the Gwydir, Mehi and Moomin sections were also considered 3-4% AEP[12]. Indicating this was a widespread floodplain and river system event of around a 1 in 25-year likelihood. This scale of the event was likely a result of the pre-wetting from the earlier flood, just months prior.

Figure 5: Flooding Gwydir 2012 – Left: Rowena region with cotton gin underwater. Right: Moree township.

During this time 3,450,000 ML of total system flows distributed across the valley and floodplains. A local bird breeding event in the Gwydir wetlands occurred afterwards[14] which can occur with large-scale natural events such as these.

The Gwydir event was not isolated in the Gwydir. With 8,500,000 ML[15] gauged at Bourke over the similar period and many valley's flooded simultaneously.

During this time Menindee Lakes filled and were surged as they were over capacity (see Figure 3: Menindee Lakes 10-year Cumulative Inflows. Source: WaterInsights and Figure 4: Menindee Lakes 10-year Storage Behaviour, Inflows and Outflows. Source: WaterInsights).

There was extensive opportunity to floodplain harvesting during this time from across the northern basin.

3.4.4 2016

2016 is included in these records as this event is a moderate flood level that created substantial flooding in the watercourse, along the lower Gwydir and Gingham area due to operational constraints within the river. It did not create widespread flooding in the valley like 2011 and 2012. The volume of this flood was a third of that in 2011 and 2012 with the majority flowing towards the watercourse and wetlands.

Supplementary sharing rules provide a basis for sharing within river flows between critical needs, the environment and water users when water is available. In the Gwydir that means the first 500ML to the wetlands then any flows greater than that are shared equally between the environment as planned environmental water and water users, environmental water holders also hold 13% of supplementary licences.

In 2016 between August and September these rules restarted rivers after three years of low inflows. At this time supplementary allocations of 171,000 megalitres were accessed by water users (including the environmental water holders) and 200,000 megalitres flowed directly to wetlands and another 255,000 megalitres out of the valley over that year. There was also 2,500,000 megalitres of flows gauged at Bourke, provided by these rules from

[14] https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-for-the-environment/waterbirds-returning-gywdir-wetlands-190612.pdf

[15] Real time data calculation for total daily flow at Bourke, 2011-13 to match Water Balance Reporting periods upstream.

across the Northern Basin. Menindee also filled to nearly 93% as water flowed down the length of the system (again see Figure 3 and Figure 4).

Floodplain harvesting was spatially limited to areas of the floodplain within significant river constraints or chokes. That's why the 2016 flood for the Gingham and lower Gwydir areas is important to understand the limitations in managing flows in the Gwydir Valley when the flow rate is higher than 20,000megalitres/day upstream of the Tarelaroi Regulator. For safe operation of the river infrastructure, WaterNSW are required to remove the regulating infrastructure and allow flows to naturally pass. This often results in a lowering of hydraulic pressure at the regulator and limits the management of water by the river operator until flow rates decline. The result, there is limited ability for WaterNSW to direct this water down the Mehi River and flows remain within the Gwydir River system and naturally flows towards the watercourse area west of Moree.

3.4.5 2021

A flood warning in the Gwydir was issued via the Bureau of Meteorology on 22 March 2021. The flood was slightly larger than 2011 but less than 2012. It was reported that at Moree the flood was a near 5% AEP flood or 1 in 20 year flood likelihood, while the heights at Pallamallawa were consistent with a 10% AEP flood or 1 in 10 year flood. This indicates that there was a large volume of localised floodwater in and around the Moree region, that was not a result of upstream inflows. This resulted in a lower upstream flood height, with higher peaks and longer duration downstream and significant flooding through the Moree township (see Figure 6: Moree flooding March 2021. Photo: Sacha Estens).

Figure 6: Moree flooding March 2021. Photo: Sacha Estens

Flooding during March 2021 occurred extensively across the region and floodplain. At the time of the flooding up to 200mm of rain had fallen locally on farms, with full supplementary

allocations announced but not all was accessed. WaterNSW later reported in their Barwon Darling end of year report[16] that:

"In late March 2021, a significant rainfall event across the catchments of Northern NSW and Southern Queensland provided substantial inflows into the Barwon-Darling with flows reaching through to Menindee Lakes. Menindee Lakes since 2016, with water being released in to the two lower lakes (Menindee and Cawndilla) for the first time in 5 years."

"Barwon-Darling has received over 2,161 GL [2,161,000 megaltires] of inflows… with 1,534 GL [1,534,000 megalitres] recorded flowing out of the tributaries."[16]

Flows contributing from the Gwydir during this period included 99,000 megalitres from the north along the Gil Gil, 230,000 megalitres from the Mehi and Moomin in the south were all gauged by the rivers there. For the first time, Water NSW also estimated the additional unregulated inflows from the Gwydir from the floodplain area particular the south-western portion of the valley that was extensively in flood (and that does not flow towards the Gwydir Wetlands) and this was 630,000 megalitres[16]of additional drainage into the Barwon system that was not directly gauged and the extent of flooding is evident by Figure 7: Satellite image of Gwydir Valley, 28 March 2021 below.

This was the first, whole of valley floodplain harvesting opportunity since 2012 for the region.

It is estimated 1,000,000 megalitres of inflows occurred during the flood, with significant losses incurred through the process of wetting up the dry lakes. But with the rivers and floodplains still wet, there has been subsequent good river inflows in the Northern basin which has meant Menindee Lakes still has inflows being received and is currently at around 73.5% with 1,173,083 megalitres of water.

[16] https://waterinsights.waternsw.com.au/api/water-source/v2/updates/689/attachment

Figure 7: Satellite image of Gwydir Valley, 28 March 2021

4 Healthy Floodplain Project

4.1 Process

This reform has been a long process. Whilst this process is detailed within the Guideline for the Implementation of the NSW Floodplain Harvesting Policy[17] and subsequent technical reports such as the Floodplain Management Plans and Model Build Reports. The following represents a summary of involvement from a farm-scale perspective.

- Eligibility criteria was checked including farm detail and existing approvals and dates of construction.
- Irrigator behaviour questionnaire was completed which included personal farm information dating back to 1993 and 10-years of model calibration data, including estimated volumes of take and cropping records. This was to update recent irrigator behaviour and crop information.
- Farms were inspected by project staff, then again by the Natural Resources Access Regulator to map and record all farm infrastructure. This was then checked again against approvals and dated using aerial imagery to assess construction dates.
- Farms were surveyed by LiDAR to measure storages and levees. This was often cross checked against on-ground surveys, at the cost of industry (the farmer).

[17] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0007/272338/guideline-for-implementation.pdf

- Farm infrastructure was assessed against previous and new floodplain management plan criteria. Any ineligible works remediated and any remaining, unapproved works sort approval through existing processes.
- Farms were assessed via aerial imagery for cropping areas for key periods.
- Individual farm water balances were created, calibrated and validated. These were consulted on with farmers to check inputs and assumptions.
- Consultation on farm scale parameterisation occurred, which often included the need for new evidence at the expense of the farmer as with new farm survey's, engineering assessments and farm water balance calculations.
- Submissions into two versions of draft entitlements were prepared by individuals and the industry.
- Submissions into measurement policy, including testing and trialling measurement methods were undertaken by individuals and industry.
- Submissions into draft entitlements by individuals, often at their own expense.

4.2 Model Outcomes

The DPIE W model results in 2021 as outlined within the Model Scenario reports and later updated in the Rainfall Runoff Exemption and Modelling Results report[18] show an increase in current condition diversions within the valley over the key scenarios which establish the legal limits of take for NSW, being the Cap (1993/1994) and the Water Sharing Plan Limits (2004).

DPIE W in their Factsheet 'Legal Limits are Getting Smaller' explain:

"Legal limits are designed to protect water resources, ecosystems and communities from the impacts of over-extraction. Limits are expressed as a formula rather than volume. This makes them adaptable, able to take into account the best available information and any advances in modelling. The limits have evolved over time to improve environmental outcomes – less water is available for legal extraction than it used to be." [19]

THE CAP

Agreed Ministerial Council Definition "The volume of water that would have been diverted under 1993/94 levels of development"

A summary of these limits, compared with current conditions as determined by the model upgrade and the outcome after proposed licencing regime is implemented is presented below in Table 3: Summary of Healthy Floodplain Modelling Results. Source: DPIEW). The floodplain harvesting licencing program is to reduce the volume of water taken by floodplain harvesting to ensure total extraction in the valley remains within legal limits. In the Gwydir's

[18] DPIEW, Rainfall Runoff Exemption and Modelling Results - Gwydir Valley, March 2021 https://www.industry.nsw.gov.au/__data/assets/pdf_file/0011/354278/rainfall-runoff-gwydir.pdf

[19] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0009/404667/An-overview-of-legal-limits.pdf

case, the legal limit as determined by the Water Sharing Plan, is the Cap[20] as it is the lesser long-term diversion volume.

Table 3: Summary of Healthy Floodplain Modelling Results. Source: DPIEW.

	Legal Limit [1] 2021 (GL)	Current Conditions 2021 (GL)	Compliance Approach (GL)	Difference (GL) (legal limit and compliance)
Total long-term extraction (RR Exempt)	**403.8**	**444.0**	**402.5**	**-1.3**
Essential Supplies (HS, TWS)	12.6	15.1	15.1	+2.5
General Security	203.9	198.4	201.5	-2.4
Supplementary	111.2	92.9	92.7	-18.5
FPH	66.1	122.2	82.2	+16.1
FPH non exempt rainfall	10.0	15.5	11.0	+1.0
FPH exempt rainfall	27.6	36.3	41.1	+13.5

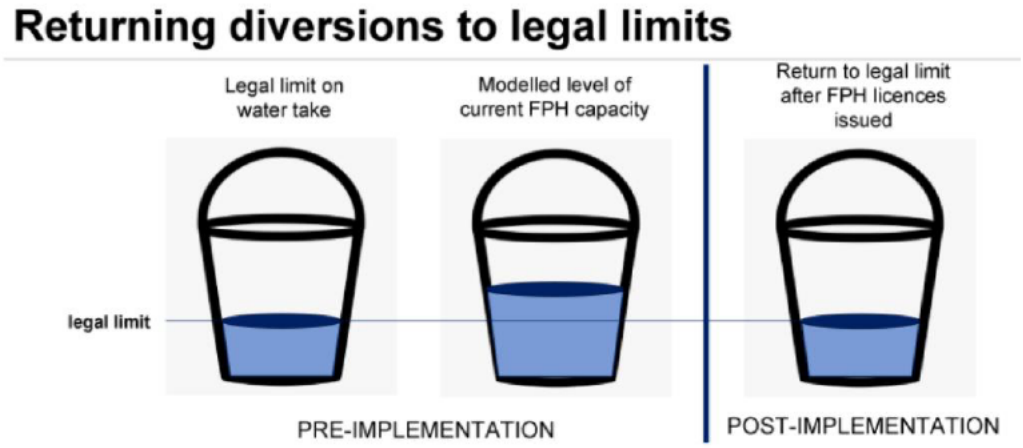
[1] For the purposes of the Gwydir Valley, modelling determined that the Cap becomes the defining legal limit as it is the lesser of Water Sharing Plan limit or the Cap.

It's important to note that individual categories of use may change, model parameters such as storage and irrigation areas may change but that the total diversions, as represented as row one is the key outcome of the water sharing framework. This is illustrated by the Department's bucket analogy Figure 8 below – note results from Row 1 in Table 3: Summary of Healthy Floodplain Modelling Results. Source: DPIEW) have been superimposed to align with the buckets below.

The modelling results indicated there was a 10% growth in extraction (Comparing the total legal limit to current conditions), which needs to be addressed to meet obligations for the *NSW Water Management Act 2000* and the *Cth Murray Darling Basin Plan 2012* and Murray Darling Basin Cap on diversions.

[20] https://www.mdba.gov.au/sites/default/files/pubs/diversion-formula-register-v6.pdf

Figure 8: DPIEW Illustration of purpose of floodplain harvesting licencing implementation.



Long-term	Legal Limit	Current Conditions	Compliance Approach
	403.8 GL	444.0 GL	402.5 (GL

On July 1 2021, the NSW Water Minister reduced supplementary water availability by 50% (or 90,000 megalitres) to step towards achieving the long-term limit of 403.8GL (403,800 megalitre long term diversion) in the Gwydir Valley. This was a direct consequence of results from the Healthy Floodplains Project. This approach is inequitable between water users, with supplementary water entitlement owners being burdened with the growth in use created by floodplain harvesting water users.

Alternatively, the proposal is to licence floodplain harvesting via an allocation of 108,000 unit shares can achieve the same outcome. This is less than the current volume of floodplain harvesting take of 137,700 megalitres (including 15,500 megalitres of rainfall) and will over the long-term reduce floodplain harvesting to 93,200 megalitres (includes 11,000 megalitres of rainfall).

The long-term reduction of 44,500 megaltires, is then targeted to the group of licence holders that can be evidenced via modelling to have caused the overall growth in diversions to be greater than the legal limits.

4.3 Model Comparisons

Models are subject to change over-time, they are designed to replicate processes. They are used comparatively and are not fixed results, they are an

MANAGING TAKE TO WITHIN LEGAL LIMITS

Currently, modelling results indicate there is a **10% growth** in extractions above the legal limits in the Gwydir Valley.

Option 1: Licencing of floodplain harvesting take by design has been proposed to reduce long-term take of floodplain harvesting by **44,500 megalitres** to ensure the Gwydir Valley is below the legal limit. This has a **32% impact on current long-term floodplain water availability** for these water users.

Option 2: Reducing other forms of licenced take to ensure legal limits, which starts with a **90,000 megalitre** reduction in supplementary water. This has initially has a **50% impact on all supplementary water** users who have not created growth in use, it includes the Commonwealth Environmental Water Holder.

answer in a point in time for a set of inputs. Changing inputs, to improve assumptions or update climate data for example, can result in a change in outcome. This is also relevant when considering that legal limits (as with the Cap definition earlier) are defined by the outcome of the model, not the inputs themselves. DPIE W explain:

"All legal limits are based on a set of conditions at a particular point in time e.g. Cap uses 1993/94 and LTAAEL 1999/2000. As such, legal limits are not a set volume. Limits are volumetrically estimated using models that represent those time periods and are configured with best available information. Estimates can be updated with better information - this means that the output of a model at a certain time, which is the volumetric estimate of the limit, can change if better information becomes available."[19]

When new information is gathered, which can be as simple as actual water take data or new climate, a new calculation may result in a change in model outcome. This may mean a new definition of long-term limit. This is not new, and is explained by the Murray Darling Basin Authority here:

"Under the Basin Plan, as with the Cap system, some diversions are not well understood, and the limit currently used is considered the best available information. Governments are committed to obtaining more information about these diversions, and continuously improving measurement and monitoring—this means the BDL estimates will be improved in the future through the accreditation of water resource plans."[21]

A list of regions within the Murray Darling Basin that have had their limits changed and the reasons, are included on the Murray Darling Basin 'Current diversion limits for the Basin' webpage[22].

That's why the data and evidence used to inform or build these models must be reported and described. NSW prepared Cap Implementation Reports, like for the Gwydir Valley[23] at the development of their custom-built Integrated Quantity/Quality Model (IQQM) in the early 2000's.

The models were later upgraded to test and define Water Sharing Plan rules, as part of the development of Water Sharing Plans this was later determined as the Water Sharing Plan Limit Scenario.

NSW again prepared model build reports for the Healthy Floodplains project, as in the model build reports for the Gwydir Valley[24]. This report explained the new information sources that were utilised by the Department in their upgrade of the Gwydir IQQM from river reach scale modelling used for Cap and Water Sharing Plan development, to the farm-scale modelling utilised now. A key improvement was the adoption of additional lines of evidence including satellite imagery, updated storage volumes using LiDAR to support assumptions, as opposed to a reliance on surveys or limited imagery in the 2000's. It was aimed at better

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[21] https://www.mdba.gov.au/basin-plan-roll-out/sustainable-diversion-limits/changing

[22] https://www.mdba.gov.au/node/5448

[23] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0004/353641/gwydir-river-valley-iqqm-cap-implementation-summary-report.pdf

[24] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0015/350205/model-build-report.pdf

defining floodplain harvesting take over time and as a result, model outcomes have changed with this new information. The Murray Darling Basin Authority explains this:

"As floodplain harvesting is regulated and measured, sustainable diversion limits in NSW will change to properly include floodplain harvesting along with other forms of take.

Over the past few years, NSW has considered data from hydraulic models, gauged streamflow, remote sensing, satellite imagery, aerial photos, flood and licensing records, as well as survey and on-ground inspection data.

This work was part of the Australian Government funded 'Healthy Floodplains Project' in NSW to improve data and planning for floodplain harvesting."[25]

The IQQM was as a result of Commonwealth funding updated and as described by DPIEW there were six scenarios prepared, including an update to the Cap Scenario, the Water Sharing Plan Limit Scenario, the Baseline Diversion Limit Scenario which had been previously reported by the Department.

Figure 9: DPIEW Scenario descriptions for the 2021 Gwydir IQQM. Source: DPIEW Model Build Report for the Gwydir Valley.

Table 4 Scenarios referenced in the Gwydir Valley model

Scenario name	Description
2008/09 Scenario	Uses the levels of irrigation infrastructure, water licences, and management rules in the Gwydir regulated river system in place at the start of 2008/09
Eligible Development Scenario	Uses the levels of irrigation infrastructure determined to be eligible[1] for floodplain harvesting entitlement, water licences, and management rules in the Gwydir regulated river system as at the start of 2008/09
Current Conditions Scenario	Uses the best available (more contemporary than 2008) information on current levels of irrigation infrastructure, water licences, and current water management arrangements, in the Gwydir regulated river system
Cap Scenario	Uses the irrigation infrastructure, water licences, and management rules in place at 30 June 1994, to assess the diversions permissible under the Murray-Darling Basin Ministerial Council's Cap on diversions
WSP Scenario	Uses the irrigation infrastructure in place in the 1999/00 water year, and the management arrangements and water licences set out in the water sharing plan
Baseline Diversion Limit (BDL) Scenario	Equivalent to the lesser of the Cap and WSP scenarios, also referred to as the Plan Limit Scenario

[1] This includes some works that were approved, but not constructed at the commencement of the 2008/09 water year.

[25] https://www.mdba.gov.au/basin-plan/sustainable-diversion-limits/floodplain-harvesting-overland-flows

It's important to recognise that the updates to the model and any changes in outcomes, does not mean new water is being made available, but rather a better representation of the water that has been allowed to be taken over-time at each of these scenarios.

Table 4: Cap Scenario Comparisons for Gwydir Valley below compares the outcomes of the two separate scenarios for Cap from the 2009 accredited model[26] and the recently reported, 2021 model construction[27] used to inform the floodplain licencing outcome.

Key differences in the inputs include:

- Climatic scenario: Previous model ran for 1890-2004 the new scenario can be run for 1890-2019;
- On-farm storage: total on-farm storage was revised downwards following review of images as part of the Healthy Floodplains Project.
- Maximum Irrigated Hectares: Revised following aerial image review and crop water requirements. This is a theoretical maximum and is not the actual maximum but represents the upper limit on water requirements that the model can demand over the climatic sequence.

Table 4: Cap Scenario Comparisons for Gwydir Valley

	Cap Scenario 2005 (accredited 2009)	Cap Scenario 2021 (HFP outcomes report)
HS and Towns (GL/Yr)	9	9
GS/HS (GL/Yr)	221	213
Supplementary	109	117
Overland Flow (GL/Yr)	24	38
Rainfall (GL)	84	67
TOTAL Diversions (GL/Yr)	447	448
Theoretical Irrigated Area (Ha)	84,000	92,000
Estimated On-farm Storage Volume (GL)	363	291

Acknowledging that models can improve and that as a result, outcomes of scenarios and possibly limits defined by these scenarios can change, is imperative to accepting the outcomes of the Healthy Floodplains Project. The risk is, if we do not acknowledge they can improve and outcomes revised, then we potentially lock a set of conditions which are unable to be adaptable. This is particularly relevant when we consider likely changes in climate and the inclusion of actual floodplain harvesting measurement data likely to be incorporated into future models.

Throughout the implementation of the Healthy Floodplains Project, outcomes from the model have been subject to change because of improvement. In March 2017, eligible floodplain

[26] From our own records, the model archive report online as Footnote 23 is not for the accredited version.

[27] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0013/350203/scenario-report.pdf

harvesters in the Gwydir Valley received a draft entitlement determination. Shortly after this notification, these results were redacted, and the Floodplain Harvesting Policy was reviewed and consulted on as part of the Water Reform Action Plan. An independent peer review and subsequently, additional on-farm data collected by the newly formed Natural Resources Access Regulator were acquired and incorporated. The data capture resulted in a significant reduction in the valley-wide floodplain harvesting volumes being offered as draft entitlements in May 2021.

The current model results which were used to support the draft licensing determination issued to eligible floodplain harvesters in May 2021, are compared against previous draft determinations and our own internal modelling estimates and presented in Table 5: Comparison of Modelling Scenarios.

This table is presented to highlight that through improved data collection, the long-term modelled estimates can change and may redefine limits by reducing them or increasing them. In the case of improvements through the Healthy Floodplains Project, data gathering has not significantly changed Cap scenario outcomes but has significantly changed current condition outcomes between 2017-2021, resulting in a significant reduction in proposed licences shares between 2017 and those communicated in 2021.

The May 2021 draft licence is also significantly lower than the internal estimates by us. This means that the 32% impact from current conditions from the licensing proposal, maybe underestimated by the Department.

The discrepancy between the Department and our own internal estimates, is why we support a process to incorporate actual floodplain measurement data into the model. This step is needed to improve confidence for all stakeholders, including water users who want to ensure the licencing program enables their historical access but also, other water users and communities can ensure their fair share also.

Table 5: Comparison of Modelling Scenarios . Source DPIE W and GVIA.

	Current Conditions Overland Flow (GL/Yr)	Compliance (Licensing approach) Overland Flow (GL/Yr)	Theoretical Maximum Take (GL)	Theoretical Irrigated Area (Ha)	Estimated On-farm Storage Volume (GL
2017 Draft Licenses (HFP Stage 1)	232	217	1302	110,000	621
2021 Draft Licences (HFP outcomes report)	137.7	93.3	540	120,000	523
GVIA Internal Estimates	233-219	NA	569	70,000[1]	NA

[1] 70,000 ha is the maximum actual irrigated hectares planted to cotton in the Gwydir Valley since water recovery for the Murray Darling Basin Plan in 2008, this has reduced from the previous peak of 90,000 hectares (see www.gwydircotton.com.au)

5 Terms of Reference

The Terms of References agreed to by the NSW Legislative Council include:

1. That a select committee be established to inquire into and report on the Government's
   management of floodplain harvesting, including:

   (a) the legality of floodplain harvesting practices,

   (b) the water regulations published on 30 April 2021

   (c) how floodplain harvesting can be licensed, regulated, metered and monitored so that it is sustainable and meets the objectives of the Water Management Act 2000 and the Murray- Darling Basin Plan and,

   (d) any other related matter.

2. That the committee report by 30 November 2021.

5.1 The legality of floodplain harvesting practices

The intent to have floodplain harvesting licences represented as a separate form of access licences in the Water Management Act has existed since the transition of all other forms of water take in the early 2000s. This is evidenced in the first iterations of water sharing plans as evidenced in Appendix 3 of the Water Sharing Plan for the Gwydir Regulated River Water Source which in summary:

"The Water Act 1912 provided powers to license floodplain harvesting. However, this was never applied as there was generally no requirement to restrict total overall water extractions or off-allocation diversions…..

…A separate category of licence will be established…

…all existing floodplain harvesting works and floodplain harvesting extractions will be licensed."[1].

Just because multiple Governments have failed to fully enable this process to completion, does not automatically make the practice illegal.

It's important to also note:

- Floodplain harvesting is a recognised form of take in Schedule E (formerly Schedule F) of the Murray-Darling Basin Agreement for the recording of
  water diversions from the river system of the Murray-Darling Basin, "the Cap" as it includes *"Land-surface (Floodwater) Diversion by Licensed Pumpers = The sum of all the estimated floodplain water harvesting diversions occurring in the Gwydir River Valley"*[20].

- The Commonwealth and NSW Government have both invested in the Healthy Floodplains Project to calculate the volume of this form of take with an intention to licence it within the Water Management Act 2000 at levels that ensure its consistency with relevant legal limits. This process included engaging with water users who meet specified eligibility criteria.
- Floodplain harvesting remains outside the scope of influence of the *NSW Water Management Act 2000* within the regulated water sources as indicated by the Crown Solicitor. The reason being that water on a floodplain is not yet a "declared water source" that needs a licence, exemption or right and whether because of that floodplain harvesting is indeed "take" of water[28]. This position was supported by the legal advice supplied by NSW Irrigators Council of which we are a member.

This does create an issue for unregulated water users, whereby overland flow is considered part of the unregulated water source within the relevant water sharing plan as in the Gwydir. A compliance and regulatory issue may arise when new metering regulations for any unregulated works are due because of the condition to take water using a pattern approved meter, which in most circumstances is not suitable for overland flow interception.

We wrote to the Department and WaterNSW about needing a process for these users to ensure they can continue their practices as defined by their licence and meet their measurement obligations. Currently, there is no regulatory process to measure overland flow, as it was disallowed as part of the regulations published in April 2021.

We have made a recommendation to amend the Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2021 to address this anomaly.

We recommend that the Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2021 is revised, if a pathway to licensing cannot be secured as soon as practically possible. This is proposed as an interim measure to adapt the regulation to allow a pathway to capture actual floodplain harvesting data in NSW as soon as practically possible and provide a pathway for unregulated users, to appropriately measure the capture of overland flow as part of their existing licence.

5.2 The water regulations published on 30 April 2021

The GVIA provided six recommendations to DPIE W, as part of our participation in the public exposure and consultation on the proposed regulations[29], which were later amended and published on 30 April 2021. Of these recommendations, five remain relevant to the three regulations later published. These include:

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28 https://www.parliament.nsw.gov.au/tp/files/78564/Crown%20Solicitor%27s%20Advice%20No.%201.pdf

29 GVIA Submission into Proposed legislative amendments for floodplain harvesting in NSW, December 2020:https://www.gvia.org.au/media/website_posts/301/GVIA-Submission-draft-regulations_December-2020.pdf

1. The GVIA recommend the implementation of the Water Management (General) Amendment (Floodplain Harvesting) Regulation 2020 because it replicates the clear and transparent process implemented as part of the Healthy Floodplains Project within the current regulatory framework, which upon implementation will have the following key benefits:

    - Protect the environment and users from further growth, providing certainty to communities who rely on floodplain flows.
    - Restrict future growth will maintain and improve floodplain flows downstream, including any environmental assets.
    - Mandate measurement and reporting.
    - Improve compliance options through volumetric monitoring as well as controls of floodplain works.
    - Improve the communities confidence in water management.
2. The GVIA recommend the implementation of the Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2020 as it reflects the conditions in the Floodplains Harvesting Measurement Policy and because it mandates a fit-for-purpose, repeatable, auditable measurement and reporting approach for floodplain harvesting take that can be verified by the regulator which is consistent with all other major forms of water take.
3. The GVIA recommend that any measurement approach should be supported by a strong and proactive compliance framework that uses the most current technology, we support that this regulation enables a three-fold compliance approach that includes:
    1. The measurement and reporting of take by individuals (new);
    2. The monitoring of valley-wide take within valley-limits (currently estimated but to be actual volumes); and
    3. The compliance of floodplain structures to standardised floodplain management plans.
4. The GVIA recommend that the draft regulations are amended to refer to “a floodplain harvesting measurement period”, which clearly defines the point when overland flow is being taken and when the exemption would not apply and has consistency with the Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2020.
5. The GVIA recommend the Water Management (General) Amendment (Exemption for Rainfall Run-off Collection) Regulation 2020 is implemented providing state-wide consistency to the incorporation of long-standing activity of retaining rainfall runoff within irrigation developments, as required by existing conditions and approvals to maintain the environmental benefits they were designed to protect.

We continue to support these recommendations and the regulations published, noting that if an urgent solution cannot be agreed then an interim solution to enable measurement should be encouraged as proposed earlier.

We recommend these three regulations published on April 2021:

1. **Water Management (General) Amendment (Floodplain Harvesting) Regulation 2021.**

2. **Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2021.**
3. **Water Management (General) Amendment (Exemption for Rainfall Run-off Collection) Regulation 2021).**

are considered fit for purpose to enable the licencing, measurement and accounting of floodplain harvesting take in NSW as soon as practically possible.

5.3 How to licence Floodplain Harvesting

The legislative process to licence floodplain harvesting is clearly defined pathway that has be implemented for all other forms of take. The specific regulations that outline this process for floodplain harvesting have already been consulted. The regulations published in April 2021 are the appropriate machinery required to license and meter floodplain harvesting.

DPIE W has also undertaken consultation on the valley-specific, localised rules that demonstrate how the regulatory framework will be applied to individual water sharing plans areas. This has occurred in the Gwydir Valley with the outcomes of that process summarised throughout this submission in the Introduction and the section dedicated to the Healthy Floodplain Project.

Unless the NSW Parliament accepts regulations of this kind, it simply will not be possible for floodplain harvesting to be regulated in a consistent way with all other major forms of water take. Until such time that this happens this form of take remains unmanaged, unmetered and unaccounted. This means that the benefits and outcomes of licensing in our valley and others, are further delayed and unrealised.

The issue is more one possibly of timing; should the licensing program be stalled to allow the collection of measurement data to improve confidence or address concerns around drought management, or, should limits on take be enabled, and a process be established to incorporate any new information to be incorporated when it becomes available.

If the former is chosen, we recommend the revision of the Water Management (General) Amendment (Floodplain Harvesting Measurement) Regulation 2021 to allow a pathway to collect and incorporate actual floodplain harvesting measurement data into the model.

The latter was proposed by the NSW Government and consulted on as part of proposed rules for water sharing plans. This is evidenced in the 'What we heard report' for the Border Rivers[30]. There is not such equivalent report for the Gwydir Valley as yest despite consultation being competed in March 2021.

Whilst there are benefits and risks with both approaches. It is important to remember that this form of take will remain unmanaged, unmeasured and unaccounted until such time NSW Parliament enables it to be licensed and metered. Having floodplain harvesting unmanaged is also having unintended consequences on other water users and communities through lack of certainty and confidence as regions recovery from the drought.

[30] https://www.industry.nsw.gov.au/__data/assets/pdf_file/0020/350237/what-we-heard-report.pdf

5.4 Any Related Matter

As part of the debate about licensing Floodplain harvesting issues around drought management have been conflated. Licencing floodplain harvesting has no impact to irrigators, no environmental outcomes or downstream connectivity benefit in droughts, there just is not any water (or floods) to floodplain harvest.

Rivers need to be full and spilling to create the floodplain harvesting opportunity or the floodplain wet enough to create runoff.

The connection between floodplain harvesting and licencing, and low flows in downstream catchments, appears to make the following incorrect assumptions:

- The upstream floodwater is the only source of inflows which can contribute to connectivity, ignoring existing flow rules for other, more reliable forms of take.
- The volume of water diverted during a flood has a material impact on the downstream outcomes.
- That all floodwaters can directly contribute to downstream, regardless of the location and magnitude of the flood.
- That flooding only occurs as water makes its way to river, rather than the rivers being full and spilling.
- That triggers on floodplain harvesting access is needed to enable connectivity of rivers.

The confusion of drought and flood policy, as part of the floodplain harvesting debate, as well as ongoing media and social media commentary has presented many incorrect claims regarding floodplain harvesting.

This submission has been prepared as evidence against many of these claims. But we also provide more direct responses to some of these claims within the media on a dedicated webpage[31].

5.4.1 Recognition of existing rules

All northern catchments have a suite of existing rules for sharing unregulated flows, called supplementary access in water sharing plans (see summary below). These provide the framework to share flows proportionally when they are available. In episodic, ephemeral and largely distributary systems like the northern valleys, sharing water when its available recognises these hydrological and operational challenges. Managing for specific fixed outcomes will not work in the northern valleys, it is much simpler in single tributary systems with re-regulating structures such as those that exist in the southern systems.

However, there are remnants of fixed rules in interim format exist in some plans but these have not been operationalised since their drafting in 1994, given the introduction of sharing arrangements in 2000 and the challenges in gauging and forecasting. New resumption of flow rules in the Barwon-Darling are considered a fixed rule approach, the recent implementation of these rules in February 2021 resulted in the target again being superseded.

[31] https://www.gvia.org.au/water-policy/water-management-framework/floodplain-flow-and-licensing/key-facts/

Existing Water Sharing Plan Rules

Macquarie – objective to deliver to marshes as priority downstream of Warren

Supplementary trigger is more than 5,000ML/day over weir at Warren (plus any orders) and can be predicted. The trigger provides for full capacity of 4000ML/day and losses to the Macquarie Marshes. Water must flow through the marsh to make it downstream.

The environment gets first 5,000ML, then any flows above 5,000GL are shared . Any flow greater than 12,000ML/day will send water down effluents or to marshes as above capacity.

Border Rivers – volumetric trigger plus ratios for sharing with NSW:QLD:environment

Supplementary trigger must be 10,000ML over two days upstream of Goondiwindi (Macintyre, Brook and Dumaresq) and is passed over the Mungindi weir.

25% of total flow to environment.

Remaining 75% shared 50:50 between NSW:QLD. Flows greater than 27,000ML/day will provide more to the environment, either downstream or into smaller effluents.

Majority of valley inflows are supplementary events due to dam location (30% of catchment represented in catchment dams).

Gwydir – volumetric trigger with sharing, flows focussed on wetlands

Supplementary trigger occurs when flows greater than 500ML/day at Pallamallawa/Gravesend with a 50:50 share between the environment and water users.

Limited stream capacities – 900ML/day at Bronte on the Mehi and 300ML/day on Gil Gil. Flows greater than 20,000ML/day upstream of Pallamallawa cannot be managed and go to the wetlands.

New rules allow for the direction of the not extracted share of supplementary events to be directed by discretion and planning of the environmental water managers, which can be to wetlands or other streams.

Namoi – multiple scenarios for triggers which are volumetric and event based.

Simplified (summarised) version provides a supplementary trigger if less than 90,000ML in Dam and flow trigger is 500ML/day, if more than 90,000ML than a minimum 1,000ML/day must flow down the end of the system (lowest gauge measure) but the starting trigger for individual sections, varies down the stream from 5,000ML/day flow to 1,500ML/day flow protecting an estimated 66% of the upstream triggered flow.

Flows are also then shared 10% to irrigators between July-October (90% environment) and then 50% from November to June.

Existing supplementary rules already provide the most efficient and effective way to deliver water within river systems particularly, during droughts when the floodplains are dry.

It must be acknowledged there is no rule or mechanism that can make water appear in a river that is not there and at times, as we have seen recently, there will not be any flows available to share (under existing rules) or with a trigger.

5.4.2 Recognising operational limitations

Demonstrated by the Northern Basin First Flush and the recent management of resumption of flow rules and active management in the Barwon Darling, there are technical and operation limitations to the ability to forecast and predict flows. In each of these events, the risk is worn by the foregoing upstream community who has their access limited without any opportunity to recapture the opportunity lost. No to forget, the downstream outcomes modelling has demonstrated negligible impact to downstream flows.

For example, conservatism and delays in the First Flush management approach where a final target of 200,000 megalitres resulted in more than 500,000 megalitres of flows into Menindee Lakes. This translated into a 30% general security allocation for Lower Darling water users while upstream communities remained on zero or 1.9% for the Gwydir.

Our region had foregone 17,800 megalitres of supplementary potential and an unknown volume of floodplain harvesting that we were restricted from. Collectively the northern valleys lost opportunity of 100,000ML[32] as reported by DPIE W.

For these reasons, more work must be undertaken to improve the capacity or capability to design and implement any new rules-based management options to not undermine the future viability of upstream communities.

5.4.3 Pathway to addressing drought management

Existing supplementary rules as opposed to floodplain access rules already provide the most efficient and effective way to deliver water within river systems during droughts, when there has been limited or no rain and the floodplains are dry.

A process to address low flow concerns in the northern basin, firstly needs a clear and agreed definition of success but should also focus on the most efficient solution, being within river flows. A rules-based framework for within river flows that recognise channel capacity as a drought contingency measure for critical needs, is the preferred and most practical pathway to NSW's current use of temporary restrictions within the public interest.

When it does rain, supplementary flows are often triggered either prior or immediately after floodplain access.

Existing rules provide a basis for sharing within river flows between critical needs, the environment and water users when water is available. A rules-based approach in this manner allows everyone an opportunity to benefit in the flows rather than selectively transferring benefits during these events between communities, as evidenced by the First Flush management approach.

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[32] Assessment of take and protection during first flush flows via https://www.industry.nsw.gov.au/__data/assets/pdf_file/0014/316310/assessment-of-take-and-protection-during-first-flush-flows-in-the-northern-basin.pdf

Sharing rules can also be used to mitigate the risk of creating overbank flows by recognising channel constraints in the effluent systems.

Ignoring this framework and focusing on downstream flow alone, has been demonstrated to have significant ramifications for industry and the upstream communities. As we stated in our submission into the Independent Assessment of the First Flush on page 9:

"*…the proportion of losses which were greater for this event almost equalled the remaining share of flow. This means that given the NSW Environmental water manager has discretion on where to send the unallocated portion of supplementary water, this water could have still been directed downstream within channel capacity and industry could have had almost their full share without impacting the downstream flow outcomes.*

….meaning, in all [inflow events during the first flush], normal water sharing plan rules both existing and proposed, would have seen a similar outflow outcome from these events given the location of the events, their intensity and the channel constraints in the Gwydir Valley.

The opportunity foregone of 100,000ML[33] as reported by DPIEW would therefore, not have resulted in a 1:1 reduction in inflows into Menindee Lakes. Providing limited access to ensure flows remained within channel capacity would have provided an additional 10,000-17,000ML of supplementary access (depending on the timing of announcements), which is the residual volume as reported by DPIEW within the assessment of take report[33].

Nonetheless, these flows would have provided a much-needed boost to our community's drought recovery. The economic impact of this foregone flows, that would not have substantially contributed to further flows downstream but are estimated at $17.4M to $29.6M of post farm gate economic activity for our region alone[34]."

A rules-based sharing arrangement is agreed by all stakeholders to provide the greatest transparency and certainty, taking away the need to rely on temporary mechanisms such as section 324 orders in the "public interest".

It is our understanding that the NSW Government has initiated steps to address critical drought management concerns in preparation for the statutory review of the Water Sharing Plan for the Barwon Darling Unregulated Water Source and recommendations from the Independent Assessment of the Northern Basin First Flush.

We recommend a concurrent work program is established to address critical drought management concerns via a rules-based sharing arrangement agreed by all stakeholders to provide the greatest transparency and certainty, taking away the need to rely on temporary restriction mechanisms.

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[33] Assessment of take and protection during first flush flows via https://www.industry.nsw.gov.au/__data/assets/pdf_file/0014/316310/assessment-of-take-and-protection-during-first-flush-flows-in-the-northern-basin.pdf

[34] Calculation of 10,000-17,000ML foregone access equating to $800/ML opportunity cost with a 2.178 community value as per the Australian Bureau of Statistics calculation method, noting for cotton the community multiplier is reported as 3.

6 Conclusion

Gwydir Valley Irrigators Association (GVIA) is the representative body for irrigation entitlement holders in the Gwydir Valley and for 20-years have engaged in the NSW Government policies and programs to license floodplain harvesting.

We have engaged in good faith in the interests of securing certainty for our industry and our community that relies on floodplain flows.

We have made this commitment despite knowing it will be to the detriment of our current levels of water availability, because we recognise and advocate for a sustainable future for our industry, our local environment, and our communities. We are not asking for this at the expense of others, just to recognise our fair share, as they too, should also be allowed.

It is now up to the NSW Parliament to do what was committed back in 2000 and enable a framework that can licence, measure, and account for floodplain harvesting state-wide in NSW.

Until such time, this form of take remains unmanaged, unmeasured and unaccounted and the benefits and outcomes of the proposed licensing implementation in our valley (and others), as presented here, are further delayed.

Drought management is an important issue. But this is a different discussion than how to licence floodplain harvesting and must be part of a larger policy discussion about water sharing options in extreme droughts into the future.

We have provided three recommendations to assist the Committee to achieve the outcome of finally incorporating floodplain harvesting into the contemporary management framework. 20-years is long enough.

Ends.

Attachment A: Stakeholder Expressions of Support for Floodplain Harvesting Licensing & Metering

WENTWORTH GROUP OF CONCERNED SCIENTISTS	**Wentworth Group of Concerned Scientists** *"We recognise the progress made on these much needed reforms to ensure all forms of take are licenced, metered and brought into a compliance framework based on diversion limits. We also appreciate that the proposed reform is aimed at reigning in the growth of FPH diversions that have occurred since implementation of the 1993/94 valley-wide Cap on diversions."*[35]
Australian Government Commonwealth Environmental Water Office	**Commonwealth Environmental Water Holder** *"Bringing floodplain harvesting (FPH) into the NSW licencing framework is supported by the Commonwealth Environmental Water Holder (CEWH), in the context of knowing the overall use of the water resource and thereby providing a means to protect significant environmental assets and ecosystem functions within NSW."*[36]
Environmental Defenders Office	**Environmental Defenders Office** *"There are benefits to bringing floodplain harvesting within a licensing and associated compliance framework, such as a requirement that the water taken under a licence must for the first time be metered and measured.* *Further, not all floodplain harvesting that has occurred up to the present day will be licensed (that is, the licensing is supposed to reduce the volume of water that is being diverted from floodplains)."*[37]

[35] https://wentworthgroup.org/2020/12/border-rivers-fph-rules/2020/

[36] https://environment.gov.au/system/files/pages/dca287c3-73bd-4ec1-a3b1-c29dd5cf95f9/files/cewh-submission-independent-review-floodplain-harvesting-nsw-water-resource-plan-nov-2018.pdf

[37] https://www.edo.org.au/2020/12/09/floodplain-harvesting-without-the-necessary-protections-legal-action-is-a-risk/

	**Murray-Darling Basin Authority** *"The MDBA is supportive of the suite of reform measures that NSW is undertaking to bring floodplain harvesting into both the NSW licensing and regulatory framework and the Commonwealth framework for regulating water resources in the Murray–Darling Basin.* *Measurement and metering of take by floodplain harvesting is critical to building confidence and understanding of the impacts of this form of take on the environment and river flows."*[38]
	**NSW Irrigators' Council** *"We want full licensing and metering for floodplain harvesting as soon as possible."*[39]
	**South Australian Royal Commission** *"A licensing and metering regime for floodplain diversions is necessary. New South Wales and Queensland must act on this issue to restore confidence within their own communities and amongst Basin States.* *In New South Wales, it is frankly remarkable that a floodplain diversion policy has still not been implemented. Although the policy has been revised, it reveals no substantial change that could justify the failure to implement it. There is no objection, in principle, to the approach canvassed by New South Wales that would require floodplain diversions to be licensed and floodplain structures to be approved, having regard to the impact of diversions and the construction of infrastructure upon the*

[38] https://www.parliament.nsw.gov.au/lcdocs/submissions/67992/0001%20Murray%E2%80%93Darling%20Basin%20Authority.pdf

[39] https://www.nswic.org.au/wordpress/wp-content/uploads/2020/09/2020-09-22-MR-FPH-Exemption-Regulation.pdf

	environment and downstream users by reference to a Floodplain Management Area Plan."[40]
Government of South Australia	**South Australian Government** *"The Royal Commission also recommended a licensing and metering regime for floodplain diversions. South Australia supports Basin Governments developing this proposal to strengthen and improve existing regimes aimed at addressing water theft."*[41]

40 https://www.environment.sa.gov.au/topics/river-murray-new/basin-plan/murray-darling-basin-commission

41 https://www.environment.sa.gov.au/files/sharedassets/public/river_murray/basin_plan/sa-response-mdb-royal-commission.pdf