WENTWORTH GROUP
OF CONCERNED SCIENTISTS

Dr Emma Carmody, Mr Peter Cosier AM, Prof Tim Flannery FAA, Mr Mike Grundy, Dr Terry Hillman AM, Prof Lesley Hughes, Prof David Karoly FAA, Prof Richard Kingsford, Prof Martine Maron, A/Prof Bradley Moggridge, Prof Jamie Pittock, Mr Robert Purves AM, Prof Fran Sheldon, Ms Anna Skarbek, Prof Bruce Thom AM, Mr Martijn Wilder AM.

NSW Government's floodplain harvesting targets prioritise irrigation extraction over needs for communities and river health

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The NSW Government recently announced flow targets to protect first flush and critical low flows from being extracted by floodplain irrigators. However, the targets the NSW Government has proposed are set so low that they will never meaningfully restrict floodplain harvesting and will fail to ensure that water for river health and community needs are prioritised above irrigation, a requirement of the *NSW Water Management Act 2000*.

Flow targets have been established to protect higher priority water needs in parts of NSW for decades. Some Water Sharing Plans use flow targets to protect baseflows from extraction while the resumption of flow rule, and Interim Unregulated Flow Management Plan for the North-West (Barwon-Darling) use flow targets to protect flows on an event-by-event basis.

Flow targets in the context of floodplain harvesting are a set of triggers at specified gauges which represent the river flow rates needed to meet environmental and community needs during unregulated flow events. These triggers turn on and off, restricting and allowing extraction depending on whether the higher priority needs have been satisfied. Floodplain extraction is permitted once it is known that the flow targets will be met. The targets are not flow volumes that must be delivered from public dams or through river management, they are the flow conditions which trigger access to unregulated flows. In this way, floodplain harvesting targets protect a portion of flushing flows needed to sustain river health and downstream communities while allowing floodplain extraction when higher priority needs have been met.

Establishing flow targets for floodplain harvesting is essential for ensuring that environmental and downstream needs are met before irrigation extraction can occur.

However, the proposed targets do not set aside a portion of flushing flows needed to sustain river health and community needs; flows which would have otherwise occurred in the absence of floodplain harvesting. These flows include:

- Bankfull and overbank: higher flows that are needed to prevent the drying out of floodplain environments to maintain and rejuvenate Ramsar wetlands, support Aboriginal cultural values, sustain flow-dependent ecosystems and reduce toxic blackwater events;
- Small and large freshes: pulses of medium-sized in-channel flows that are needed to replenish and connect waterholes and weir pools, provide spawning cues for native fish, and reduce risks of blue-green algal blooms; or
- Baseflows: low in-channel flows essential for ensuring the rivers can flow, safeguarding against mass fish deaths and providing safe and clean drinking water for downstream communities.

Without improvement of the proposed flow targets, the floodplain harvesting policy:

- fails to achieve the objectives of the *Water Management Act 2000* to protect water resources and their dependent ecosystems;
- does not comply with the *Water Management Act 2000* 'priority of use' requirements;
- leaves held and planned environmental water vulnerable to extraction;

Suite 4, 3B Macquarie Street, Sydney NSW Australia 2000
Telephone: +61 2 9251 3811 Email: information@wentworthgroup.org ACN 128 963 431

- allows floodplain irrigators to extract water while communities downstream might not have access to clean drinking water or water to bathe in;
- further disenfranchises Aboriginal people's access to water;
- will continue to threaten a broad range of species and ecological communities; and
- continued alteration of natural flow regimes and alienation of floodplains and wetlands from rivers will directly result in new listings of threatened ecological communities and species under the *Biodiversity Conservation Act 2016*.

NSW Government needs to improve flow targets to provide public confidence that irrigation can occur without compromising the essential water needs of the river and its communities.

Specific issues

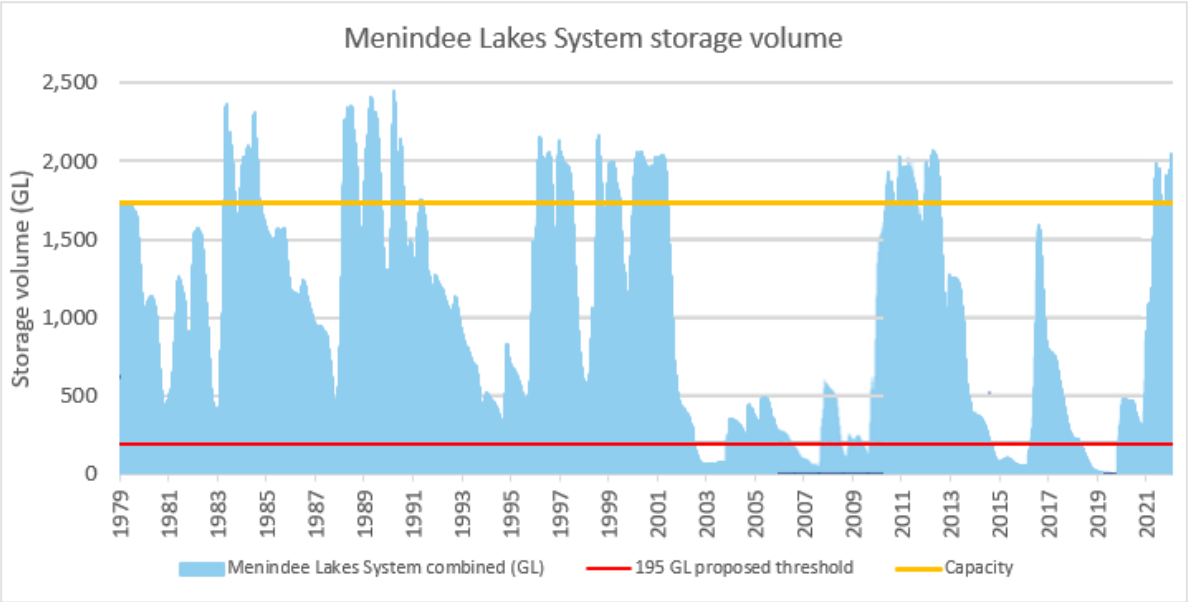
The proposed targets restrict take only if the volume of water in the Menindee Lakes system falls below a certain threshold (the 'restriction condition'). This restriction on take will cease if any of the low level flow targets proposed for individual rivers by the NSW Government are met (the 'allowing conditions').

Issue 1: There is only one condition that restricts floodplain harvesting, this condition is only triggered in very dry conditions and will not protect higher priority local needs at any other time.

Floodplain harvesting would only be restricted if the volume of water held in the Menindee Lakes System falls below 195 GL (red line in figure below).

Over the past 43 years the volume of Menindee Lakes has only been recorded below 195 GL six times, always during extreme droughts. Between 1979 and 2002 the Menindee Lakes never fell below this level. After 2002, the volume stored in Menindee Lakes regularly fell below 195 GL, largely due to over-extraction upstream and changes in lake management practices.

As a consequence, the proposed restriction condition would be rarely triggered and will be ineffective in protecting higher priority local needs in most years.



Adapted from [Draft regional water strategy: Western – Critical dry condition triggers] 2022.

Even when valley-wide restrictions on floodplain harvesting have been triggered by Menindee falling below 195 GL, the restriction within a valley ceases if a small flow triggers the very low 'allowing condition' in each valley (discussed further in issue 3). This is the case even in extreme or prolonged drought events. The consequence is that floodplain harvesting would be permitted upstream when there is insufficient water supply for the Lower Darling environment and communities from the Menindee Lakes.

The proposed approach contains only one restricting trigger but many allowing triggers. This approach is less effective than the existing resumption of flow rule in the Barwon-Darling which contains restricting and allowing triggers at multiple locations within the valley. Local restriction triggers are needed so that local conditions determine if local high-priority environmental and community needs must be met before floodplain harvesting is allowed.

Issue 2: The 195 GL target at Menindee Lakes is inadequate to meet the water needs of the Lower Darling.

The volumetric target at Menindee represents critically low storage conditions and, after taking into account up to 125 GL of inaccessible 'dead' storage in the Menindee Lakes System, the target results in less than 12 months-worth of emergency supply, with no allocation for lower Darling communities.

It is not clear if the 195 GL target has appropriately considered total inaccessible storage, transmission losses through the system, increased evaporation during drought periods when this target is activated, or the additional volumes of water needed to restart the Lower Darling River once it has ceased flowing.

The proposed volume is almost 2.5 times less than the 480 GL of water available in the Menindee Lakes just 12 months before the mass fish kills occurred in the summer of 2018-19. It is only by improving lake management and protecting at least two summers supply (i.e., 18 months) that a repeat of the massive fish kills could be avoided during the next dry period.

Issue 3: Local targets are inadequate to meet local higher-priority water needs.

As discussed above, even when valley-wide restrictions on floodplain harvesting have been triggered by Menindee falling below 195 GL, the restriction within a valley ceases if a small flow triggers the very low 'allowing condition' in each valley.

Currently, the proposed targets are specified as a total volume and lack any duration. Accordingly, they are almost meaningless and assumptions must be made to understand the potential impact of the targets. It is not clear how these flow targets were determined or if they were based on established science. Table 1 shows that the targets at most sites are so low that at best they protect a small fresh and at worst they fail even to protect a baseflow. Any higher priority water needs that require flows above these rates including large freshes, bankfull or overbank flows, or for longer durations, will not be protected by the proposed targets.

Additionally, even when assuming the targets are met within 5 days, the resulting flows are generally much lower than the measured average flow for each site over the historical record. Finally, these targets are substantially lower than the Barwon-Darling resumption of flow targets and the targets proposed by the Department to the Connectivity Stakeholder Reference Group.

Table 1. Comparison of local flow targets with measured average flows and science-based flow requirements.

Location	Local flow targets proposed by NSW Government[1] (ML/d)			Measured average flow[2] (ML/d)	Flows required for environmental outcomes[3] (ML/d)				
	assuming 30 days	assuming 10 days	assuming 5 days		Baseflow	Small Fresh	Large Fresh	Bank full	Overbank
Barwon River at Mungindi	100	300	600	1,500	160	540	3,000	7,900	10,000
Carole Creek near Garah	23	70	140	200	70	200	900		2,000
Gingham Channel Teralba	33	100	200	225	50	250	1,000		
Gwydir d/s Tyreel Offtake	33	100	200	200	50	250	800	3,500	
Mehi near Collarenebri	13	40	80	275	40	90	800		
Namoi River at Walgett	10	30	60	1,800	30	200	2,250	8,500	10,600
Warren weir	167	500	1,000	1,850	200	450	4,000		12,000
Wilcannia	133	400	800	5,700	350	1,400	14,000	25,000	30,000

[1]NSW Government's rules for floodplain harvesting licences to protect first flush flows assuming specified durations, [2]calucated using daily timeseries from NSW water monitoring network, and [3]environmental flow requirements specified in NSW Long-Term Watering Plans.

The proposed flow targets represent only low flows. Flow targets must be implemented that protect a range of essential flows (e.g., flows to protect drying floodplains, water for fish passage and wildlife refuges, flow-dependent communities and cultural values) during moderate to wetter years.

Recommended improvements to flow targets

For flow targets to be effective they must protect high-priority flow requirements for within-valley and downstream environmental and community needs. This includes legislative responsibilities for key wetland sites, such as Ramsar sites, threatened species and communities and water needs for communities, such as those along the Darling as well as First Nations peoples.

Flow targets should be underpinned by best available scientific information. We recommend those set out by the NSW Government as environmental water requirements in Long-term Watering Plans. At least one target should be specified for each valley, across all flow thresholds, not just baseflows after extended drought. A portion of all flow regimes from baseflows up to bankfull and overbank flows need to be protected from extraction in each valley to ensure connectivity of flushing flows represented by these higher flow regimes.

Finally, all local flow targets must act as both a restricting and permitting condition in conjunction with the Menindee Lakes target. This ensures local conditions are used to determine the trigger at which floodplain extraction can commence and that local high priority water needs are first met. The restricting conditions should be based on whether each flow regime has occurred in a pre-defined period of time which should be set based on best available scientific information (Table 2). Further, these targets need to have a specified period for review and adjustment of policy to ensure management outcomes are being achieved, given the current poor information base and the need for improved scientific information.

Table 2: Example showing how flow targets can be applied in the context of floodplain harvesting. Floodplain harvesting access is dependent on whether flow target conditions have been achieved. If flow targets have not been met within the required timeframe, floodplain harvesting is restricted (orange, red) until the target is achieved. When a target is met (green), floodplain harvesting is permitted.

Flow outcome	Flow component	Example flow target (based on best available science of water requirements)	Flow target achievement (based on observed data)
Native fish species	Baseflow	160 ML/d for 220 days, 100% of years at X gauge	Achieved – FPH permitted
	Small fresh	540 ML/d for 10 days, 100% of years at X gauge	At risk of not being achieved – FPH not permitted
	Large fresh	3,000 ML/d for 15 days, 75% of years at X gauge	Not achieved – FPH not permitted
	Bankfull	7,900 ML/d for 5 days, 50% of years at X gauge	Not achieved – FPH not permitted
	Overbank	13,000 ML/d for 5 days, 20% of years at X gauge	Not achieved – FPH not permitted
Waterbird species	Low flow	20 ML/d for 350 days, 100% of years at Y gauge	Achieved – FPH permitted
	Bankfull	40,000 ML/d for 5 days, 25% of years at Y gauge	At risk of not being achieved – FPH not permitted
	Overbank	60,000 ML/d for 1 day, 25% of years at Y gauge	Not achieved – FPH not permitted
Reed, swamps, grasses, and other aquatic plants	Baseflow	200 ML/d for 271 days, 100% of years at Z gauge	Achieved – FPH permitted
	Large fresh	4,000 ML/d for 14 days, 75% of years at Z gauge	Not achieved – FPH not permitted
	Bankfull	12,000 ML/d for 3 days, 50% of years at Z gauge	At risk of not being achieved – FPH not permitted
	Overbank	18,000 ML/d for 3 days, 50% of years at Z gauge	Not achieved – FPH not permitted
River red gum forests	Bankfull	8,500 ML/d for 5 days, 40% of years at W gauge	At risk of not being achieved – FPH not permitted
	Overbank	10,600 ML/d for 10 days, 30% of years at W gauge	Not achieved – FPH not permitted
Coolabah and Blackbox forests	Overbank	21,750 ML/d for 3 days, 50% of years at V gauge	Not achieved – FPH not permitted